

NOTES ON THE
PHARMACOPŒIAL PREPARATIONS
—
GRIFFITHS

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NOTES

ON THE

PHARMACOPŒIAL PREPARATIONS

(B. P., 1867); *2nd ed. 1874*

SPECIALLY ARRANGED FOR THE USE OF STUDENTS
PREPARING FOR EXAMINATION.

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TO

RAWDON MACNAMARA, M.D., F.R.C.S.I.,

PROFESSOR OF MATERIA MEDICA AND EX-PRESIDENT OF THE ROYAL COLLEGE OF
SURGEONS IN IRELAND, SURGEON TO THE MEATH HOSPITAL,

This little Volume

IS INSCRIBED

AS A

SLIGHT TOKEN OF RESPECT FOR

HIS PROFESSIONAL AND SCIENTIFIC ATTAINMENTS,

AND OF

GRATITUDE FOR MANY PERSONAL KINDNESSES.

PREFACE.

I HAVE endeavoured in the following pages so to contrast, classify, and comment upon the Pharmacopoeial Preparations as to facilitate the acquisition of such a knowledge of them as may be necessary for Medical and Pharmaceutical Students.

The "NOTES" were originally compiled for my own pupils, and have already appeared in the "Students' Column" of THE MEDICAL PRESS AND CIRCULAR.

The new chemical notation has been adopted throughout the work.

It but remains for me to acknowledge with gratitude the valuable suggestions with which I have been favoured by many of my friends, more especially by Dr. John Barker, Examiner in Materia Medica to the Royal College of Surgeons in Ireland.

W. HANDSEL GRIFFITHS.

April 1st, 1873,
17 HUME STREET, DUBLIN.

NOTES

ON

THE PHARMACOPŒIAL PREPARATIONS.

THE DILUTE ACIDS.

Acidum Aceticum Dilutum.

„ **Hydrochloricum Dilutum.**

„ **Nitricum Dilutum.**

8 „ **Nitro-hydrochloricum Dilutum.**

„ **Sulphuricum Dilutum.**

„ **Sulphuricum Aromaticum.**

„ **PHOSPHORICUM DILUTUM.**

„ **HYDROCYANICUM DILUTUM.**

All these preparations, with the exception of the two latter, may be conveniently grouped together as *Dilute Acids*, whose neutralizing power is measured by the amount of *Volumetric Solution of Soda*, which they are capable of saturating (a).

Aromatic Sulphuric Acid is in reality a Dilute Acid, and as such I have included it in the accompanying table.

I have thought it desirable to contrast the members of this group in a tabular form, as follows :—

(a) 1,000 grain measures of the Volumetric Solution of Soda contain one equivalent in grains (40) of NaHO, and will therefore neutralize an equivalent quantity of any acid.

Acid.	Preparation.	Neutralization.	Per Centage Strength.	Sp. Gr.
<i>Acidum Aceticum Dilutum.</i>	Dilute 1 part of Acetic Acid with 7 parts of distilled water.	One fluid ounce requires 313 grain-measures of the Volumetric Solution of Soda, and therefore corresponds to 16 grains of anhydrous acid.	3·63 per cent of anhydrous acid.	1·006
<i>Acidum Hydrochloricum Dilutum.</i>	Dilute 8 parts of Hydrochloric Acid with distilled water until the mixture measures 26½ parts at 60° F.	Six fluid drachms require 1,000 grain-measures of the Volumetric Solution of Soda, and therefore correspond to 36½ grains (or one equivalent) of Hydrochloric Acid.	10·58 per cent. of real acid.	1·052
<i>Acidum Nitricum Dilutum.</i>	Dilute 6 parts of Nitric Acid with distilled water until the mixture measures 31 parts at 60° F.	Six fluid drachms require 1,000 grain-measures of the Volumetric Solution of Soda, and therefore correspond to 54 grains (or half an equivalent) of anhydrous acid (N_2O_5).	14·95 per cent. of anhydrous acid.	1·101
<i>Acidum Nitro-Hydrochloricum Dilutum.</i>	Mix 3 parts of Nitric Acid with 4 of Hydrochloric Acid, and 24 hours afterwards add 25 parts of distilled water in successive portions.	Six fluid drachms require 920 grain-measures of the Volumetric Solution of Soda.		1·074
<i>Acidum Sulphuricum Dilutum.</i>	Dilute 7 parts of Sulphuric Acid gradually with distilled water until the mixture measures 83½ parts at 60° F.	Six fluid drachms require 1,000 grain-measures of the Volumetric Solution of Soda, and therefore correspond to 40 grains (or half an equivalent) of anhydrous acid (SO_3).	10·14 per cent. of anhydrous acid.	10·94
<i>Acidum Sulphuricum Aromaticum.</i>	Mix 3 ounces of Sulphuric Acid gradually with 2 pints of rectified spirit, and macerate in this mixture for 7 days, 2 ounces of powdered cinnamon and 1¼ ounce of powdered ginger.	Six fluid drachms require 830 grain-measures of the Volumetric Solution of Soda, and therefore correspond to 33·2 grains of anhydrous acid.	10·91 per cent. of anhydrous acid.	0·927

ACETA (VINEGARS).

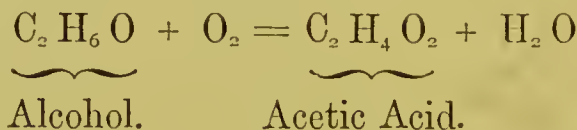
These are :

Acetum.

„ **Scillæ.**

„ **Cantharidis.**

Acetum (British Vinegar) is now defined as “an acid liquid prepared from malt and unmalted grain by acetous fermentation.” The following formula illustrates the theory of *acetification* :—



It will thus be seen that the alcohol is converted by the absorption of oxygen from the atmosphere into acetic acid and water. The process of acetification is now very rapidly effected by allowing the fermenting liquor to trickle slowly through wood-shavings contained in tall vats. A large surface is thus exposed to the air which circulates through small side holes pierced near the bottom of the vessels.

British vinegar contains 4·6 per cent. of anhydrous acetic acid. One fluid ounce (445·4 grains by weight) requires for neutralisation 402 grain-measures of the Volumetric Solution of Soda. Its specific gravity ranges from 1·017 to 1·019.

Sulphuric acid acts as a preservative of vinegar, and hence the presence of 1-1,000th part is legally permitted. The following test indicates that the lawful proportion of sulphuric acid is not exceeded.—The precipitate afforded by the addition of 10 minims of solution of chloride of barium to 1 ounce of vinegar having been removed by filtration, the further addition of solution of chloride of barium will give no precipitate.

The only pharmacopœial compound in the preparation of which vinegar is employed, is the *Emplastrum Cerati Saponis*.

Acetum Cantharidis.

Preparation. — Digest 2 ounces of powdered cantharides in a mixture of 2 ounces

Acetum Scillæ.

Preparation.—Macerate 2½ ounces of squills in 20 ounces of dilute acetic acid for seven

of glacial acetic acid, with 13 ounces of acetic acid for 2 hours at 200° F. When cold place them in a percolator, and when the fluid no longer drops add 5 ounces of acetic acid to the residuum. When percolation is completed, press and make up the bulk of the liquid to 20 ounces with acetic acid.

days, strain with expression, and to the strained fluid add 1½ ounces of proof spirit, and lastly, filter.

It must be borne in mind that these so-called "vinegars" are solutions of the active principles *not in vinegar* but in very strong acetic acid in the case of *Acetum Cantharidis*, and in dilute acetic acid in the case of *Acetum Scillæ*.

It may be mentioned that heat is employed in the preparation of acetum cantharidis, as it promotes the solution of the active principle *cantharidine*.

Acetum Scillæ enters into the composition of Oxymel Scillæ and Syrupus Scillæ.

AQUÆ (WATERS).

The waters are fourteen in number, namely :—

Aqua.

- „ Distillata.
- „ Camphoræ.
- „ Aurantii Floris.
- „ Menthæ Piperitæ.
- „ Menthæ Viridis.
- „ Rosæ.
- „ Sambuci.
- „ Laurocerasi.
- „ Cinnamomi.
- „ Anethi.
- „ Carui.
- „ Fœniculi.
- „ Pimentæ.

Aqua (H₂O). The purest natural water that can be obtained, cleared if necessary, from substances *mechanically suspended* in it by filtration. It should be free from taste, odour, and visible impurity.

The most common impurities of natural waters are saline matters, as sulphate of lime, carbonate of lime (held in solution by excess of carbonic acid, and conferring on water the property of "hardness"), &c., besides gasses. Water is termed "hard" or "soft" according to its action on soap. In hard waters the contained earth (lime or magnesia) combines with the fatty acid of the soap, forming a substance insoluble in water. Hard waters may be rendered soft by boiling, by which means carbonic acid is driven off, and the carbonate of lime which was held in solution by it is deposited.

The amount of hardness destroyed by boiling is termed "*temporary hardness*," as distinguished from the permanent hardness due to soluble salts of lime and magnesia, which still remain in boiled water.

Professor Clarke, the inventor of the soap test for the amount of lime in water, proposed as a means for softening water containing carbonate of lime, the addition of sufficient lime-water to unite with the carbonic acid. The carbonate of lime thus formed, together with that already existing in the water is deposited, and three-fourths of the hardness of the water is removed.

"Mineral Waters" are those which hold in solution saline or gaseous substances, whence they derive medicinal properties. There are four classes of them, viz.:—*Class 1. Carbonated*, containing much carbonic acid, and usually saline carbonates, on which the carbonic acid acts as a solvent (Carlsbad, Seltzer, Ilkstone, &c.). *Class 2. Chalybeate*, containing carbonate of iron (Harrogate, Pyrmont, Spa, Tunbridge Wells, &c.), and sulphate of iron (Brighton, &c.). *Class 3. Saline*, of which there are several varieties—*calcareous*, containing carbonate and sulphate of lime (Bath, Bristol, &c.),—*alkaline*, containing alkaline carbonates (Ems, Vichy, &c.),—*purging saline*, containing sulphates of magnesia and soda (Cheltenham, Seidlitz, &c.), and *salt*, containing chlorides, and sometimes traces of iodine and bromine (sea-water, Baden-Baden, Kreutznach, Wiesbaden, &c.). *Class 4. Sulphuretted*, containing sulphuretted hydrogen (Aix-la-Chapelle, Cheltenham, Harrogate, &c.).

Aqua Distillata. Prepared by distilling 10 gallons of water from a copper still. All the volatile impurities come over with the first half gallon, and hence this is to be

rejected. On the other hand, the distillation is not to be continued after 8 gallons have passed over, lest empyreumatic matters (resulting from the charring of the organic impurities) might contaminate the product.

The tests for the purity of distilled water are :—

1. No residue on evaporation = absence of fixed impurities.
2. Not affected by *sulphuretted hydrogen* = absence of metallic impurities.
3. Not affected by *oxalate of ammonia* = absence of salts of lime.
4. Not affected by *nitrate of silver* = absence of chlorides.
5. Not affected by *chloride of barium* = absence of sulphates.
6. Not affected by *solution of lime* = absence of carbonic acid.

The remaining Aquæ may be conveniently divided into four classes, according to their method of preparation, as follows :—

CLASS 1.

Prepared by simple solution in distilled water ($\frac{1}{2}$ ounce to 1 gallon).

Aqua Camphoræ.

Aqua Caomphoræ was formerly “Mistura Camphoræ.”

CLASS 2.

Prepared by distillation of the flowers.

Aqua Aurantii Floris.

Aqua Aurantii Floris is mostly made in France, and is apt to contain lead from being imported in leaden vessels; it is hence directed to be tested with sulphuretted hydrogen.

CLASS 3.

Prepared by distillation of the volatile oil with water ($1\frac{1}{2}$ drachm of oil to $1\frac{1}{2}$ gallon, distil 1 gallon = 1 of oil in 853).

Aqua Menthæ Piperitæ.

Aqua Menthæ Viridis.

CLASS 4.

Prepared by distillation of part of the plant with water.

160 ounces to 2 gallons, distil	{	<i>Aqua Rosæ</i> (fresh petals).
1 gallon = 1 in 1 . . .	{	<i>Aqua Sambuci</i> (fresh flowers).
16 ounces to 2½ pints, distil	{	<i>Aqua Laurocerasi</i>
1 pint = 1 in 1¼ . . .	{	(fresh leaves).
20 ounces to 2 gallons, distil	{	<i>Aqua Cinnamomi</i>
1 gallon = 1 in 8 . . .	{	(bark).
16 ounces to 2 gallons, distil	{	<i>Aqua Anethi.</i> <i>Aqua Carui.</i>
1 gallon = 1 in 10 . . .	{	<i>Aqua Feniculi</i>
		(in each dried fruit).
14 ounces to 2 gallons, distil	{	<i>Aqua Pimentæ</i>
1 gallon = 1 in 11½ . . .	{	(dried unripe berries).

In the preparation of *Aqua Laurocerasi* the crushed fresh leaves are directed to be macerated in the water for 24 hours before distilling. It is not a preparation of reliable strength.

The following are the officinal compounds into the composition of which the *Aquæ* enter—

Aqua Floris Aurantii in *Syrupus Floris Aurantii*; *Aqua Cinnamomi* in *Mistura Cretæ*, in *Mistura Guaiaci*, and *Mistura Spiritus Vini Gallici*; *Aqua Menthæ Piperitæ* in *Mistura Ferri Aromatica*; *Aqua Rosæ* in *Mistura Ferri Composita* and *Trochisci Bismuthi*.

CATAPLASMATA (POULTICES).

These are :

	Cataplasma Carbonis.
	Conii.
6	Fermenti.
	Lini.
	Sinapis.
	Sodæ Chloratæ.

A poultice consists of three parts, namely, the “liquor” (the fluid part), the “corpus” (the basis or bulk of the poultice), and the “accessorium” (the active medicinal ingredient). In the following table of the Cataplasms the substances which constitute these parts respectively will be seen.

	"Liquor."	"Corpus."	"Accessorium."	Directions for Preparation.
<i>Cataplasma Fermenti.</i>	Water at 100° F. (6 ounces).	Flour (14 ounces).	Beer Yeast (6 ounces).	Mix the yeast with the water, and stir in the flour. Place the mass near the fire till it rises.
<i>Cataplasma Carbonis.</i>	Boiling Water (10 ounces).	Bread (2 ounces), Linseed Meal (1½ ounce).	Wood Charcoal (¼ ounce).	Soak the bread in the water near the fire, and, while stirring, add the linseed meal, and then half the charcoal. Sprinkle the remainder of the charcoal over the surface.
<i>Cataplasma Conii.</i>	Boiling Water (10 ounces).	Linseed Meal (3 ounces).	Powdered Hemlock leaf (1 ounce).	Mix the hemlock and linseed meal, and add them to the water, constantly stirring.]
<i>Cataplasma Sinapis.</i>	Boiling Water (10 ounces).	Linseed Meal (2½ ounces).	Mustard (2½ ounces).	
<i>Cataplasma Lini.</i>	Boiling Water (10 ounces).	Linseed Meal (4 ounces), Olive Oil (½ ounce).		Mix the linseed meal gradually with water, and add the remaining ingredient, constantly stirring.
<i>Cataplasma Solæ Chloratæ.</i>	Boiling Water (8 ounces).	Linseed Meal (4 ounces).	Solution of Chlorinated Soda (2 ounces).	

On reference to the preceding table it will be noticed that in every case, except in *C. Fermenti*, boiling water is the "liquor" used. If water at a higher temperature than 100° were employed in the preparation of *C. Fermenti*, the catalytic process which takes place would be materially interfered with. It will also be seen that, except in *C. Fermenti* and *C. Sodæ Chloratæ*, the quantity of water used is 10 ounces.

The "corpus" in the case of *C. Fermenti* is flour; in *C. Carbonis* it is bread and linseed meal; and in every other case it is linseed meal only. In *C. Lini* olive oil is used to replace the natural oil which is lost in the preparation of the meal.

The following are the strengths of the Cataplasms:—

<i>Cataplasma Fermenti</i>	...	...	...	...	1 in 4½.
„ <i>Sinapis</i>	...	...	...	...	1 in 6.
„ <i>Lini</i>	...	...	...	...	1 in 3½.
„ <i>Sodæ Chloratæ</i>	...	...	...	...	1 in 7.
„ <i>Conii</i>	...	...	...	...	1 in 14.
„ <i>Carbonis</i>	...	...	...	...	2 in 28.

It will be observed that the strength of each of the last three poultices is half that of the preceding one.

CONFECTIONES (CONFECTIONS).

There are eight of these in the Pharmacopœia, viz.—

Confectio Opii. *gr* ✓ - × ×

„ **Piperis.**

„ **Rosæ Caninæ.**

„ **Rosæ Gallicæ.**

8 „ **Scammonii.** *gr* × - × × ×

„ **Sennæ.**

„ **Sulphuris.**

„ **Terebinthinæ.**

3½ - 3¼

Confections are preparations of the consistence of a soft solid, in which medicinal substances are incorporated with saccharine matter, with a view either to their preservation or more convenient administration.

The ingredients, strength, and directions for preparation of the officinal Confections are tabulated on the following page.

		Directions for Preparation.	
Strength.	Ingredients.	Mix.	
<i>Confectio Opii.</i>	Compound Powder of Opium . 192 grains Syrup 1 ounce		
<i>Confectio Piperis.</i>	Powdered Black Pepper . . 3 ounces Powdered Carraway . . 3 ounces Clarified Honey . . 15 ounces	Triturate well together in a mortar.	
<i>Confectio Rosæ Caninæ.</i>	Hips (deprived of seeds) . . 1 pound Refined Sugar . . 2 pounds	Beat the hips to a pulp in a stone mortar, rub the pulp through a sieve, add the sugar, and rub well together.	
<i>Confectio Rosæ Gallicæ.</i>	Red Rose Petals (fresh) . . 1 pound Refined Sugar . . 3 pounds	Beat the petals to a pulp in a stone mortar, add the sugar, and rub well together.	
<i>Confectio Sulphuris.</i>	Sublimed Sulphur . . 4 ounces Acid Tartrate of Potash . . 1 ounce Syrup of Orange Peel . . 4 ounces	Triturate well together in a mortar.	
<i>Confectio Scammonii.</i>	Powdered Scammony . . 3 ounces Powdered Ginger . . 1½ ounce Oil of Carraway . . 1 drachm Oil of Cloves . . ½ drachm Syrup . . 3 ounces Clarified Honey . . 1½ ounce	Rub the powders with the syrup and honey, add the oils, and mix.	
<i>Confectio Sennæ.</i>	Powdered Senna . . 7 ounces Powdered Coriander . . 3 ounces Figs . . 12 ounces Prunes . . 6 ounces Tamarind . . 9 ounces Cassia Pulp . . 9 ounces Extract of Liquorice . . 3½ ounces Refined Sugar . . 30 ounces Distilled Water . . 24 ounces	Boil the figs and the prunes gently for four hours with 24 ounces of water, add the tamarinds and cassia pulp; digest for two hours, and press the pulp through a hair sieve; dissolve the sugar and liquorice in the pulped product by a gentle heat, and add the senna and coriander. The result should weigh 75 ounces.	
<i>Confectio Terebinthinæ.</i>	Oil of Turpentine . . 1 ounce Powdered Liquorice Root . . 1 ounce Clarified Honey . . 2 ounces	Rub the oil of turpentine with the liquorice root, add the honey, and mix.	

Confectio Piperis is intended as a substitute for "Ward's Paste." *Confectio Rosæ Caninæ* enters into the composition of *Pilula Quiniæ*, and *Confectio Rosæ Gallicæ* into that of the following pill-masses :—*Aloes Barbadosensis*, *Aloes Socotrina*, *Aloes et Assafoetidæ*, *Aloes et Ferri*, *Aloes et Myrrhæ*, *Ferri Carbonatis*, *Hydrargyri*, and *Plumbi cum Opio*.

DECOCTA (DECOCTIONS).

There are fourteen formulæ for the preparation of Decoctions, viz. :—

Decoctum Aloes Compositum.

„	Cetrariæ.
„	Cinchonæ Flavæ.
„	Graniti Radicis.
„	Hæmatoxyli.
„	Hordei.
„	Papaveris. <i>not internal</i>
„	Pareiræ.
„	Quercus.
„	Sarsæ.
„	Sarsæ Compositum.
„	Scoparii.
„	Taraxaci.
„	Ulmi.

Decoctions are watery solutions of the active principles of vegetables obtained by boiling.

The process of decoction is unsuitable in the case of vegetables whose active principles are volatile.

The length of time prescribed for boiling (in a covered vessel) varies, and is proportionate to the solubility of the active matter ; it is 10 minutes in every case except *Decoctum Aloes Compositum* (5 minutes), *Decoctum Pareiræ* (15 minutes), and *Decoctum Hordei* (20 minutes). *Decoctum Graniti Radicis* is boiled from 2 pints to 1 pint.

Infusion is more effective than decoction as a means of abstracting the principles of sarsaparilla, and hence in *Decoctum Sarsæ* and *Decoctum Sarsæ Compositum* the solid ingredients are directed to be *digested in boiling water* for one hour before being boiled in it.

The majority of the Decoctions are ordered to be *strained while hot*, as a deposit of active matter occasionally takes place when the preparation becomes cold ; the exceptions

to the rule are *Decoctum Aloes Compositum*, *Decoctum Sarsæ*, and *Decoctum Sarsæ Compositum*, which are to be strained *when cool*, and *Decoctum Cinchonæ Flavæ*, which is to be strained *when cold*.

In every case except *Decoctum Hordei*, after straining, as much distilled water is directed to be poured over the contents of the strainer as will make the strained product measure one pint, or, in the case of *Decoctum Aloes Compositum*, 30 fluid ounces.

In *Decoctum Cetrariæ* and *Decoctum Hordei* the moss and the barley respectively are directed to be washed with cold water before boiling, in the former case to remove any impurities, and in the latter case to remove any mustiness or disagreeable flavour.

All the Decoctions are simple except *Decoctum Aloes Compositum* and *Decoctum Sarsæ Compositum*; it must, however, be remembered that although *Decoctum Hæmatoxyli* is a simple decoction, 60 grains of powdered cinnamon bark are directed to be used in its preparation.

The following table shows the strengths of the Decoctions:—

2½ ounces to 1½ pints	{	<i>D. Sarsæ</i>	}	= 1 in 8
		<i>D. Sarsæ Co.</i>		
		<i>D. Ulmi</i>		
2 ounces to 2 pints	...	<i>D. Graniti Rad.</i>	}	= 1 in 10
2 ounces to 1½ pint	...	<i>D. Papaveris</i>		
1½ ounce to 1 pint	...	<i>D. Pareiræ</i>		= 1 in 14
2 ounces to 1½ pint	...	<i>D. Hordei</i>		= 1 in 15
1¼ ounces to 1 pint	{	<i>D. Cinchonæ</i>	}	= 1 in 16
		<i>D. Quercus</i>		
		<i>D. Scoparii</i>		
1 ounce to 1 pint	{	<i>D. Cetrariæ</i>	}	= 1 in 20
		<i>D. Taraxaci</i>		
		<i>D. Hæmatoxyli</i>		
		<i>D. Aloes Co.</i>		= 1 in 120

The ingredients of the compound Decoctions are as follows:—

D. Aloes Comp.
 Extract of Socotrine Aloes, 120
 grs.
 Myrrh, 90 grs.
 Saffron, 90 grs.
 Carbonate of Potash, 60 grs.
 Extract of Liquorice, 1 oz.
 Compound Tincture of Carda-
 moms, 8 oz
 Distilled Water, Q.S.

D. Sarsæ Comp.
 Jamaica Sarsaparilla, 2½ oz.
 Sassafras, ¼ oz.
 Guaiacum Wood, ¼ oz.
 Liquorice Root, ¼ oz.
 Megereon Bark, 60 grs.
 Boiling Distilled Water, 30 oz.

The use of the carbonate of potash in the preparation of *Decoctum Aloes Compositum* is to render the aloes and the resin of the myrrh more soluble in water. The extract of liquorice is useful for aiding in the suspension of the undissolved substances, while the compound tincture of cardamoms acts to a certain extent as a preventive of decomposition.

The *Decoctum Sarsæ Compositum* is an imitation of the "Lisbon diet drink."

In the former formula for the preparation of *Decoctum Papaveris* the seeds of the capsules were ordered to be rejected. The seeds are now *retained*, for it is found that their oil, which is suspended in water by the mucilage of the capsules, enhances the medicinal effects of the decoction.

EMPLASTRA (PLASTERS).

There are fourteen officinal Plasters, viz. :—

Emplastrum Ammoniaci cum Hydrargyro.

„	Belladonnæ.
„	Calefaciens.
„	Cantharidis.
„	Cerati Saponis.
„	Ferri.
„	Galbani.
„	Hydrargyri.
„	Opii.
„	Picis.
„	Plumbi.
„	Plumbi Iodidi.
„	Resinæ.
„	Saponis.

Plasters are external applications adhesive at the temperature of the body, and employed either to afford mechanical support, or to convey medicinal effects.

For the directions for the preparation of the individual Plasters reference must be made to the Pharmacopœia.

The following table shows the constitution of ten of the Emplastra :—

Oxide of Lead, Olive Oil, Water	} <i>E. Plumbi</i>	<i>E. Resinæ</i> (Resin and Hard Soap)	<i>E. Belladonnæ</i> (Extract of Belladonna dissolved in rectified spirits)
			<i>E. Opii</i> (Opium)
			<i>E. Calefaciens</i> (Cantharides, Expressed Oil of Nutmeg, Yellow Wax, Resin, Boiling-water)
		<i>E. Saponis</i> (Hard Soap and Resin)	<i>E. Plumbi Iodidi</i> (Iodide of Lead)
			<i>E. Calefaciens</i>
			<i>E. Plumbi Iodidi</i>
		<i>E. Ferri</i> (Hydrated Peroxide of Iron, Burgundy Pitch)	
		<i>E. Galbani</i> (Galbanum, Ammoniacum, Yellow Wax)	
		<i>E. Hydrargyri</i> (Mercury, Olive Oil, Sublimed Sulphur)	

The remaining Emplastra are,—

<i>E. Ammoniaci cum Hydrargyro.</i>	<i>E. Cantharidis.</i>	<i>E. Cerati Saponis.</i>	<i>E. Picis.</i>
Ammoniacum Mercury Olive Oil Sublimed Sulphur	Cantharides Yellow Wax Prepared Lard Prepared Suet Resin	Hard Soap Yellow Wax Olive Oil Oxide of Lead Vinegar	Burgundy Pitch Frankincense Resin Yellow Wax Expressed Oil of Nutmeg Olive Oil Water

On reference to the above table it will be seen that *Emplastrum Plumbi* forms the basis of no less than nine Plasters, and that of the remaining four *Emplastrum Cerati Saponis* also contains a compound of olive oil and oxide of lead. *Emplastrum Ammoniaci cum Hydrargyro*, *Emplastrum Cantharidis*, and *Emplastrum Picis* owe their consistence and adhesiveness to resinous substances, or to a mixture of these with wax and oleaginous matter. *Emplastrum Plumbi* is an *oleo-margarate of lead*; in its preparation the oleic and margaric acids of the oil combine with the lead, forming oleate and margarate of lead, while the glycerine, which is set free, remains dissolved in the water, or mechanically mixed with the Plaster.

In *Emplastrum Hydrargyri* and *Emplastrum Ammoniaci cum Hydrargyro* the sublimed sulphur is employed as a means of more minutely dividing the mercury.

It would be waste of time for the student to endeavour to commit to memory the relative proportions of the constituents of every Plaster; it will suffice for him to learn what the ingredients are, and the proportion of active ingredients in the mass.

The following are the strengths of the Emplastra:—

<i>E. Belladonnæ</i> (Extract dissolved by Alcohol)	} 1 in 2
<i>E. Picis</i>	} 1 in 3
<i>E. Cantharidis</i>	} 1 in $3\frac{2}{3}$
<i>E. Hydrargyri</i>	} 1 in 5
<i>E. Ammoniaci cum Hydrargyro</i> (Mercury)	} 1 in $5\frac{1}{2}$
<i>E. Cerati Saponis</i> (Soap)	} 1 in 7
<i>E. Saponis</i> (Soap)	} 1 in 8
<i>E. Plumbi Iodidi</i>	} 1 in 10
<i>E. Opii</i>	} 1 in 11
<i>E. Resinæ</i>	} 1 in 25
<i>E. Galbani</i>	
<i>E. Ferri</i> (Peroxide)	
<i>E. Calefaciens</i> (Cautarides)	

ENEMATA (INJECTIONS, CLYSTERS).

These are substances in a liquid form intended for injection up the rectum, either for the purpose of evacuating the bowel (when the quantity of liquid should be large), or for acting medicinally on the neighbouring parts or on the system (when the bulk of the vehicle should be small). There are six of them in the Pharmacopœia, viz. :—

Enema Aloes.

- " **Assafœtidæ.**
 " **Magnesiæ Sulphatis.**
 " **Opii.**
 " **Tabaci.**
 " **Terebinthinæ.**

Mucilage of starch forms the basis of all the Enemata except *Enema Assafœtidæ* and *Enema Tabaci*, in the former of which cold water is the basis, and in the latter boiling water.

The following are the formulæ :—

	Active Ingredient.	Basis.	Other Ingredients.
<i>E. Tabaci</i>	Tobacco Leaf ... 20 grs.	8 ounces	{ Carbonate of Potash 15 grains.
<i>E. Assafoetida</i>	Assafoetida ... 30 grs.	4 ounces	
<i>E. Aloes</i>	Aloes ... 40 grs.	10 ounces	
<i>E. Opii</i>	Tincture of Opium $\frac{1}{2}$ drm.	2 ounces	
<i>E. Magnesiae Sulphatis</i>	Sulph. of Magnesia 1 oz.	15 ounces	Olive Oil 1 oz.
<i>E. Terebin- thine</i>	Oil of Turpentine 1 oz.	15 ounces	

ESSENTIÆ (ESSENCES).

Of these there are only two in the Pharmacopœia, viz.:—

Essentia Anisi.

„ **Menthæ Piperitæ.**

They are solutions of 1 part of the volatile oil in 4 parts of rectified spirit.

EXTRACTA (EXTRACTS).

These are preparations obtained by evaporating solutions of vegetable principles. They may be conveniently divided into classes according to their method of preparation.

CLASS I.

FRESH OR GREEN EXTRACTS.

Preparation.—The juice pressed out from 112 pounds of the bruised plant is heated to 130° F. to coagulate the green colouring matter; this is then filtered off, and the fluid is heated to 200° F. to coagulate the albumen, which is separated by filtration. The fluid is now evaporated, at not above 140°, to a thin syrupy consistence; the green colouring matter, which was separated in an early stage of the

process, is added, and the whole evaporated down to the required consistence.

The following are the Extracts thus prepared, with the parts of the plants used :—

- Extractum Aconiti** (Fresh leaves and flowering tops).
- „ **Belladonnæ** (Fresh leaves and young branches).
- „ **Conii** (Fresh leaves and young branches).
- „ **Hyosciami** (Fresh leaves and young branches).
- „ **Lactucæ** (Flowering herb).

Another group of Extracts belonging to this class are prepared by heating the juice at once to 212° F. *to coagulate the albumen*, filtering and evaporating to a proper consistence at 160°.

The Extracts thus prepared are :—

- Extractum Colchici** (Fresh corns without coats).
- „ **Colchici Aceticum**.
- „ **Taraxici** (Fresh root).‡

In the preparation of *Extractum Colchici Aceticum* 7 pounds of the corns are heated with 6 ounces of acetic acid before the juice is pressed out. The quantity of taraxacum root used in *Extractum Taraxici* is 4 pounds.

CLASS II.

AQUEOUS EXTRACTS.

Prepared from drugs (1 pound is the quantity directed in each case) by the action of cold or boiling distilled water, and subsequent evaporation to a proper consistence.

- 1.—Prepared by digestion in *boiling* water.

- Extractum Aloes Barbadosensis.**
- „ **Aloes Socotrinæ.**
- „ **Pareiræ.**

- 2.—Prepared by infusion in *boiling* water and subsequent boiling.

- Extractum Gentianæ.**
- „ **Hæmatoxyli.**

- 3.—Prepared by decoction.

- Extractum Anthemidis.**

- 4.—Prepared by maceration in *cold* water.

Extractum	Calumbæ.
„	Glycyrrhizæ.
„	Krameriæ.
„	Quassiæ.
„	Opii.

In all the foregoing Extracts, except those prepared by maceration in cold water, the quantity of water used is 1 gallon. In *Extractum Opii* the opium is macerated with 6 pints of water; in *Extractum Calumbæ* and *Extractum Glycyrrhizæ* the drug is macerated with 4 pints of water; while in *Extractum Krameria* and *Extractum Quassiæ* a sufficiency of water is directed. In *Extractum Anthemidis* 15 minims of oil of chamomile are directed to be added after the evaporation.

CLASS III.

ALCOHOLIC EXTRACTS.

Prepared from drugs (1 pound is the quantity ordered in each case, except in *Extractum Colocynthis Compositum*) by the action of rectified spirit, rectified spirit and water, or proof spirit, and subsequent evaporation to a proper consistence.

1.—Prepared with rectified spirit.

Extractum	Cannabis Indicæ.
„	Physostigmatis.
„	Nucis Vomicae.

In *Extractum Cannabis Indicæ* and *Extractum Physostigmatis* the drug is treated with 4 pints of cold spirit; in the former Extract the process is one of maceration, and in the latter percolation is employed as well. In *Extractum Nucis Vomicae* the drug is steamed, rapidly dried, and pulverised, and then *boiled* with successive portions of spirit until the latter comes off free from bitterness.

2.—Prepared with rectified spirit and water.

Extractum	Jalapæ.
„	Rhei.
„	Lupuli.
„	Papaveris.

In the preparation of *Extractum Jalapæ* the drug is

macerated in 4 pints of spirit and 1 gallon of water *successively*, as the action of the water is facilitated when the resin is abstracted by the spirit. In *Extractum Rhei* the drug is macerated in a mixture of 10 ounces of spirit with 5 pints of water. In *Extractum Lupuli*, after maceration in $1\frac{1}{2}$ pints of spirit, the residual hop is directed to be *boiled* with 1 gallon of water; and it must be remembered that in the preparation of *Extractum Papaveris* also *boiling* water is ordered.

3.—Prepared with proof spirit.

Extractum Colocynthis Compositum.

„ **Stramonii.**

The student should very carefully distinguish between the *Extractum Colocynthis Compositum* and the *Pilula Colocynthis Compositum*. The composition of the latter will hereafter be considered; the following are the ingredients of the former:—Colocynth pulp (6 ounces macerated in 1 gallon of proof spirit), Extract of Socotrine Aloes (12 ounces), Resin of Scammony (4 ounces), Hard Soap (3 ounces), and Cardamom Seeds (1 ounce). In the preparation of *Extractum Stramonii* the oil of the seeds is removed by the action of washed ether before percolation with the spirit.

CLASS IV.

ETHEREAL EXTRACTS.

Extractum Mezerei Ætherium.

Prepared by maceration of 1 pound of the drug in 8 pints of rectified spirit, and evaporating to form a spirit extract; the latter is then macerated in 1 pint of ether and again evaporated.

Ether is also employed in the preparation of *Extractum Stramonii*, *Extractum Ergotæ Liquidum*, and *Extractum Filicis Liquidum*,—in the two former to free the preparation from oil, and in the latter as a solvent of the active matter.

CLASS V.

LIQUID EXTRACTS.

These are fluid preparations, in which the solvent is water with rectified spirit added as a preservative.

They are :—

Extractum				Strength.
	Ergotæ Liquidum	}		
„	Belæ Liquidum			1 in 1.
„	Pareiræ Liquidum			
„	Sarsæ Liquidum	...	...	2 in 1.
„	Cinchonæ Flavæ Liquidum	...	...	4 in 1.
„	Opii Liquidum	...	...	1 in 20 (of
			extract), or 1 grain in 22 minims.	
„	Filicis Liquidum			

These liquid Extracts may, in general terms, be said to be prepared by maceration of the drug in water, evaporating the aqueous infusion, and adding spirit to prevent decomposition. The *Extractum Opii Liquidum* is prepared by digestion of the extract of opium in water, adding the spirit and filtering. Cold water is used in all cases except *Extractum Pareiræ Liquidum* (boiling water) and *Extractum Sarsæ Liquidum* (water at 160° F.). In the preparation of *Extractum Ergotæ Liquidum*, as has been mentioned, the ergot before maceration is directed to be percolated with *washed* ether, the object of which is to remove all the poisonous oil. The ether is washed to ensure its freedom from alcohol, which is a solvent of the active principle.

The so-called *Extractum Filicis Liquidum*, is rather an Ethereal Extract, and is simply made by percolating 2 pounds of the drug with 4 pints of ether.

GLYCERINA (GLYCERINES).

These are :—

Glycerinum Acidi Carbolici.

„ **Acidi Gallici.**

„ **Acidi Tannici.**

„ **Amyli.**

„ **Boracis.**

They are solutions of 1 part of the drug in 4 parts of glycerine, except *Glycerinum Amyli*, in which the proportions are 1 of starch to 8 of glycerine.

In the preparation of *Glycerinum Acidi Gallici* and *Glycerinum Acidi Tannici* solution is aided by means of gentle heat, while in *Glycerinum Amyli* heat up to 240°

is gradually applied until the starch particles are broken, and a "plasma" or translucent jelly is formed.

INFUSA (INFUSIONS).

These are aqueous solutions of the constituents of vegetables obtained without boiling. They are prepared by digesting the drug (which is to be cut small, sliced, bruised or powdered) in distilled water for a definite period in a covered vessel, and subsequently straining.

Infusion is preferable to decoction, when by the latter process the active principle is volatised (Buchu, &c.), or a chemical change induced (Senna, &c.).

The following are the officinal Infusions, with the proportion of the drug ordered; the proportion of water ordered is in each case 10 oz. :—

Infusum Digitalis,	30 grains.	
„ Quassiaë,	60 grains.	
„ Caryophylli		} $\frac{1}{4}$ ounce.
„ Chirataë		
„ Ergotæ		
„ Rhei		
„ Rosæ Acidum		
„ Serpentariæ		
„ Valerianæ,	120 grains.	
„ Catechu		} 160 grains.
„ Lini		
„ Anthemidis		} $\frac{1}{2}$ ounce.
„ Aurantii		
„ Buchu		
„ Calumbæ		
„ Cinchonæ Flavæ		
„ Cusso		
„ Cuspariæ		
„ Krameriæ		
„ Lupuli		
„ Maticæ		
„ Senegæ		
„ Uvæ Ursi		
„ Cascarillæ		} 1 ounce.
„ Dulcamaræ		
„ Sennæ		

Of the above, all are absolutely simple, except *Infusum Rosæ Acidum*, which has 1 drachm of dilute sulphuric acid added, *Infusum Catechu*, which contains 30 grains of cinnamon bark, *Infusum Lini*, which contains 60 grains of liquorice root, and *Infusum Sennæ*, which has 30 grains of ginger.

The *Compound Infusions* are:—

<i>Infusum Gentianæ Compositum.</i>	<i>Infusum Aurantii Compositum.</i>
Bitter Orange Peel, 60 grs.	Bitter Orange Peel, $\frac{1}{4}$ oz.
Fresh Lemon Peel, $\frac{1}{4}$ oz.	Fresh Lemon Peel, 60 grs.
Gentian Root, 60 grs.	Cloves, 30 grs.
Boiling Distilled Water, 10 oz.	Boiling Distilled Water, 10 oz.

In the preparation of *Infusum Lini* the seeds are not to be crushed, as the mucilage is contained in the covering. *Infusum Cusso* is directed *not to be strained*.

Boiling distilled water is used in every case, except *Infusum Chiratae* and *Infusum Cuspariae*, in which water at 120° F. is employed; while in *Infusum Calumbæ* and *Infusum Quassiae*, cold water is ordered, so that the starch may not be dissolved.

The length of time of infusion varies, and is regulated by the solubility of the active ingredients; it is one hour in the majority of cases; fifteen minutes in *I. Anthemidis*, *I. Aurantii*, *I. Aurantii Compositum*, and *I. Cusso*; half an hour in *I. Caryophylli*, *I. Catechu*, *I. Chiratae*, *I. Ergotæ*, *I. Maticoæ*, *I. Quassiae*, and *I. Rosæ Acidum*; two hours in *I. Cinchonæ Flavæ*, *I. Cuspariae*, *I. Lupuli*, *I. Serpentariæ*, and *I. Uvæ Ursi*; four hours in *I. Lini*.

LINIMENTA (EMBROCATIONS).

Preparations for external use applicable to the skin by gentle friction with the hand or by painting.

They all contain either a fixed or volatile oil or soap, camphor being regarded as a concrete volatile oil.

They may be divided into groups according to their method of preparation.

CLASS I.

Prepared by macerating and percolating twenty parts of the root with twenty parts of rectified spirit, and then adding one part of camphor.

Linimentum Aconiti	} 1 in 1.
„ Belladonnæ	

CLASS II.

Those of which olive oil forms the basis.

Linimentum Calcis	1 in 2.
„ Ammoniaë	1 in 4.
„ Camphoræ	1 in 5.

In *Linimentum Calcis* and *Linimentum Ammoniaë*, the officinal solutions are employed, and these reacting with the oil form a soap.

CLASS III.

Those of which camphor liniment forms the basis.

Linimentum Chloroformi	1 in 2.
„ Terebinthinæ Aceticum	1 in 3.
„ Hydrargyri	1 (of mercury) in 6.

Linimentum Chloroformi is a simple mixture of chloroform and camphor liniment; *Linimentum Terebinthinæ Aceticum* is a mixture of one part each of oil of turpentine, acetic acid, and camphor liniment; while *Linimentum Hydrargyri* is made by gentle heating, one part each of ointment of mercury and camphor liniment, and then adding gradually one part of solution of ammonia.

CLASS IV.

Those of which soap liniment forms the basis.

Linimentum Opii, 1 (of tincture) in 2.

This is a simple mixture of equal parts of tincture of opium and soap Liniment.

CLASS V.

Includes the Liniments of more complex constitution. The following table will facilitate the recollection of the ingredients of these :—

Linimentum.	Active Ingredient and Strength.	Ordinary Ingredients.		Extra Ingredients.
<i>L. Potassii Iodidicum Sacchar.</i>	Iodide of Potassium and Hard Soap. 1 in 9.	Oil of Lemon.		Glycerine and Distilled Water.
<i>L. Crotonis.</i>	Croton Oil. 1 in 8.	Oil of Cajuput.	Rectified Spirit.	
<i>L. Saponis.</i>	Hard Soap.	Oil of Rosemary.	Rectified Spirit.	Distilled Water.
<i>L. Camphoræ Compositum.</i>	Strong Solution of Ammonia. 1 in 4½.	Oil of Lavender.	Rectified Spirit.	Camphor.
<i>L. Sinapis Compositum.</i>	Oil of Mustard. 1 in 40.	Castor Oil.	Rectified Spirit.	Camphor. Ethereal Extract of Mezereum and Distilled Water.
<i>L. Iodii.</i>	Iodine, 1½ in 10. Iodide of Potassium.		Rectified Spirit.	Camphor.
<i>L. Terebinthinæ.</i>	Oil of Turpentine. 1 in 1½.		Camphor.	Soft Soap.

It will be noticed that the first five of these contain an oil, the next five rectified spirit, and the last five camphor.

LIQUORES (SOLUTIONS).

There are thirty-seven formulæ for the preparation of these in the Pharmacopœia. With two exceptions (*Liquor Antimonii Chloridi* and *Liquor Epispasticus*) they may be defined as consisting of substances, sometimes gaseous, dissolved in or diluted with water.

They may be conveniently divided into groups as follows:—

CLASS I.

SOLUTIONS OF THE METALLOIDS.

Liquor Iodi.„ **Chlori.**

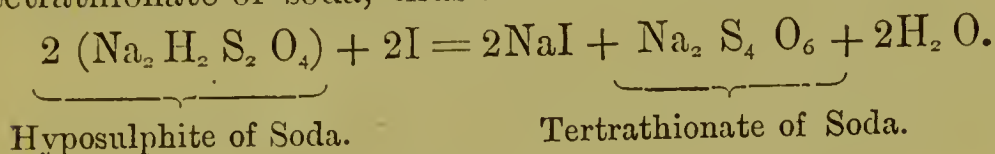
Liquor Iodi.—Prepared by dissolving 20 grains of iodine in 1 ounce of water by the aid of 30 grains of iodide of potassium. The solubility of iodine in water is greatly increased by the presence of the iodide.

Liquor Chlori.—This is a solution of chlorine gas in half its volume of water. It is prepared by passing the washed gas (made by the action of hydrochloric acid on black oxide of manganese, $4 \text{ H Cl} + \text{Mn O}_2 = 2 \text{ Cl} + 2 \text{ H}_2 \text{ O} + \text{Mn Cl}_2$) into water.

As this solution is liable to be decomposed by light and exposure to air, at first into *hydrochloric* and *hypochlorous acids*, and ultimately into *hydrochloric acid* and *oxygen*, it is directed to be preserved in green glass bottles well-stoppered, and to be kept in a cool, dark place.

Liquor Chlori is of a yellowish green colour with a strong odour of chlorine; it instantly discharges the colour of a dilute solution of sulphate of indigo. Its specific gravity is 1.003. If no fixed impurities are present there will be no residue on evaporation. The Pharmacopœia directs the following quantitative test, which indicates that the proper amount of chlorine (2.66 grains to the fluid ounce) is present:—When a solution of 20 grains of iodide of potassium in an ounce of water is added to a fluid ounce (439 grains by weight) of the *Liquor Chlori*, the mixed solution acquires a deep red colour, owing to the liberation of iodine, thus:— $\text{KI} + \text{Cl} = \text{KCl} + \text{I}$. On

adding to this coloured solution 750 grain-measures of the Volumetric Solution of Hyposulphite of Soda, the colour is discharged, owing to the reaction of the free iodine on the soda salt forming colourless iodide of sodium and tetrathionate of soda, thus :—



CLASS II.

Solutions of Alkalies or Alkaline Earths whose neutralising power is estimated by the amount of Volumetric Solution of Oxalic Acid which they are capable of saturating (a).

Liquor Ammoniae Fortior.

- „ **Ammoniae.**
- „ **Potassæ.**
- „ **Sodæ.**
- „ **Calcis.**
- „ **Calcis Saccharatus.**

We will consider consecutively the method of preparation, neutralisation, strength, specific gravity, and tests for purity of the foregoing.

Preparation.

Liquor Ammoniae Fortior is made by passing ammoniacal gas (made by the action of slaked lime on chloride of ammonium—



into water contained in a Woulff's bottle under pressure until the requisite strength is attained.

Liquor Ammoniae is simply made by diluting one part of the strong liquor with two parts of water.

Liquor Potassæ and *Liquor Sodæ* are solutions of the

(a) 1,000 grain measures of the Volumetric Solution of Oxalic Acid contain half an equivalent in grains (63) of Oxalic Acid and will therefore neutralise an equivalent in grains of an alkali or alkaline carbonate.

hydrate in water, and are both made by the action of slaked lime on the carbonate.



In each the carbonate of lime is deposited, and the supernatant liquor is directed to be decanted or drawn off with a syphon, as filters are acted upon by it.

Liquor Calcis is very simply made by saturating water with slaked lime, and decanting or drawing off with a syphon (for the same reason as in *Liquor Potassæ*) the clear solution.

Liquor Calcis Saccharatus is made by digesting for some hours a mixture of 1 part of slaked lime and 2 parts of refined sugar in 20 of water.

Slaked lime is very sparingly soluble in water, requiring 732 parts of cold, and 1,500 of boiling water. Sugar greatly increases the solubility of lime, so that the saccharated solution is fourteen times stronger than the simple solution, a fluid ounce of the latter containing only half a grain of lime.

Liquor Potassæ, *Liquor Sodæ*, and *Liquor Calcis* all strongly attract carbonic acid from the atmosphere, and hence they are to be kept in well-stoppered bottles; they are furthermore directed to be kept in *green* glass bottles, the reason of which is that they exert a solvent power over the oxide of lead of white glass.

Neutralisation.

		Grains weight.		Grain-measures of Vol. Sol.
<i>Liquor Ammoniac Fortior</i>	...	52·3	=	1,000
<i>Liquor Ammoniac</i>	...	85	=	500
<i>Liquor Potassæ</i> ...	...	462·9	=	482
<i>Liquor Sodæ</i> ...	...	458·0	=	470
<i>Liquor Calcis</i> ...	...	4,380·0	=	200
<i>Liquor Calcis Saccharatus</i>	...	460·2	=	250

Strength.

Liquor Ammoniac Fortior.—32·5 (of NH_3) per cent. One fluid drachm contains 15·83 grains.

Liquor Ammoniac.—10 (of NH_3) per cent. One fluid drachm contains 5·2 grains.

Liquor Potassæ.—5·84 (of KHO) per cent. One fluid ounce contains 27 grains.

Liquor Sodæ.—4·1 (of NaHO) per cent. One fluid ounce contains 18·8 grains.

Liquor Calcis.—One fluid ounce contains half a grain of CaO.

Liquor Calcis Saccharatus.—One fluid ounce contains 7·11 grains of CaO.

Specific Gravity,

<i>Liquor Ammoniac Fortior</i>	...	...	0·891
<i>Liquor Ammoniac</i>	...	...	0·959
<i>Liquor Potassæ</i>	...	...	1·058
<i>Liquor Sodæ</i>	..	...	1·047
<i>Liquor Calcis Saccharatus</i>	...	...	1·052

Tests for Purity.

Liquor Ammoniac Fortior:—

1. When diluted with four times its volume of water it gives no precipitate with—

- (a) Solution of lime = absence of carbonate ;
- (b) Oxalate of ammonia = absence of lime ;
- (c) Sulphide of ammonium = absence of oxide of copper ;
- (d) Ammonio-sulphate of copper = absence of sulphide of ammonium.

2. When treated with excess of nitric acid it is not rendered turbid by—

- (a) Nitrate of silver = absence of chlorides ;
- (b) Chloride of barium = absence of sulphates.

When “pyrrol” exists as an impurity of the commercial liquor, it may be detected by affording a red colour with nitric or sulphuric acid.

Liquor Potassæ and *Liquor Sodæ*.—The following tests are directed for both of these solutions :—

- 1. No effervescence with diluted hydrochloric acid.
- 2. Mixed with an equal volume of distilled water there is no precipitate with—

- (a) Solution of lime = absence of carbonate ;
- (b) Oxalate of ammonia = absence of lime.

3. Treated with excess of diluted nitric acid and evaporated to dryness, the residue forms with water a nearly clear solution, which may be slightly precipitated by—

- (a) Chloride of barium = trace of sulphides ;
- (b) Nitrate of silver = trace of chlorides ;

but is merely rendered turbid (or unaffected in the soda solution) by—

Ammonia = trace of alumina.

Liquor Ammoniae Fortior is employed in the preparation of *Ammoniae Phosphas*, *Linimentum Camphorae Compositum*, *Liquor Ammoniae*, *Liquor Ammoniae Citratis*, *Spiritus Ammoniae Aromaticus*, and *Tinctura Opii Ammoniata*.

Liquor Ammoniae is used in *Linimentum Ammoniae*.

Liquor Calcis enters into the formation of *Linimentum Calcis*, *Lotio Hydrargyri Flava*, *Lotio Hydrargyri Nigra*, and is used in making *Argenti Oxidum*.

CLASS III.

EFFERVESCENT SOLUTIONS OF ALKALIES.

Liquor Lithiæ Effervescens.

„ **Potassæ Effervescens.**

„ **Sodæ Effervescens.**

These are made by passing as much carbonic acid gas (generated by the action of sulphuric acid on chalk) as possible, under a pressure of seven atmospheres, into a solution of 30 grains of the bicarbonate (or in the case of Lithia 10 grains of the carbonate) in 1 pint of water. They all effervesce strongly when the containing vessel is opened owing to the escape of carbonic acid gas.

The following are the tests directed:—

Liquor Lithiæ Effervescens.—10 fluid ounces evaporated to dryness yield 5 grains of white residue, which answer to the tests for carbonate of lithia.

Liquor Sodæ Effervescens.—10 fluid ounces boiled for five minutes require for neutralisation 178 grain-measures of the Volumetric Solution of Oxalic Acid.

Liquor Potassæ Effervescens.—10 fluid ounces boiled for five minutes require for neutralisation 150 grain-measures of the Volumetric Solution of Oxalic Acid.

Five fluid ounces evaporated to one-fifth, and 12 grains of tartaric acid added yield a crystalline precipitate (of acid tartrate of potash) which, when dried, weighs not less than 12 grains.

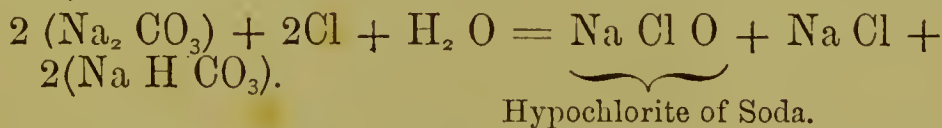
CLASS IV.

CHLORINATED SOLUTIONS.

Liquor Calcis Chloratæ.„ **Sodæ Chloratæ.**

Liquor Calcis Chloratæ is prepared by digesting 1 pound of chlorinated lime in 1 gallon of water. Hypochlorite of lime, chloride of calcium, and a little caustic lime are dissolved, but any carbonate of lime which may be present, and excess of caustic lime are thrown down and are to be separated by a calico filter.

Liquor Sodæ Chloratæ is a mixed solution of hypochlorite of soda, chloride of sodium and bicarbonate of soda, and is known as “Labarraque’s Disinfecting Fluid.” It is made by passing washed chlorine gas (made by the action of hydrochloric acid on black oxide of manganese) into a solution of 12 ounces of carbonate of soda in 36 ounces of water. By the action of chlorine on the solution of the carbonate of soda, chloride of sodium, and bicarbonate of soda are formed, thus—

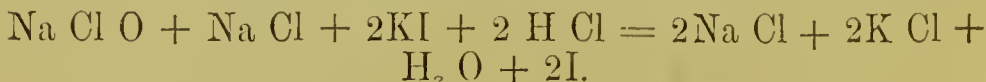


The following are the tests directed, the explanations of which are given under *Liquor Chlori* :—

Liquor Calcis Chloratæ.—One fluid drachm (60 grains) by weight) added to a solution of 20 grains of iodide of potassium in 4 ounces of water, and acidulated with 2 drachms of hydrochloric acid, gives a red solution, which requires for the discharge of its colour 500 grain-measures of the Volumetric Solution of Hyposulphite of Soda, corresponding to 13 grains of chlorine in a fluid ounce.

Liquor Sodæ Chloratæ.—One fluid drachm (70 grains by weight) added to a solution of 20 grains of iodide of potassium in 4 ounces of water, and acidulated with 2 drachms of hydrochloric acid, gives a brown solution, which requires

for the discharge of its colour 500 grain-measures of the Volumetric solution of Hyposulphite of Soda. By the mutual reaction of Liquor Sodæ Chloratæ and iodide of potassium in an acid solution, iodine is liberated, thus—



Liquor Sodæ Chloratæ has an alkaline reaction, due to the reaction of the bicarbonate; it derives its property of bleaching vegetable colours from the chlorine. On adding hydrochloric acid to it effervescence ensues, owing to the evolution of carbonic acid gas and chlorine, and a solution is formed which gives no precipitate with perchloride of platinum indicating the absence of potash. It should give no precipitate with oxalate of ammonia indicating the absence of lime.

Liquor Sodæ Chloratæ is contained in Cataplasma Sodæ Chloratæ.

CLASS V.

SOLUTIONS OF THE INORGANIC SALTS.

Liquor Ammoniæ Acetatis.

- „ **Ammoniæ Citratis.**
- „ **Antimonii Chloridi.**
- „ **Arsenicalis.**
- „ **Arsenici Hydrochloricus.**
- „ **Bismuthi et Ammoniæ Citratis.**
- „ **Ferri Perchloridi.**
- „ **Ferri Perchloridi Fortior.**
- „ **Ferri Pernitratis.**
- „ **Ferri Persulphatis.**
- „ **Hydrargyri Nitratis Acidus.**
- „ **Hydrargyri Perchloridi.**
- „ **Magnesiae Carbonatis.**
- „ **Plumbi Subacetatis.**
- „ **Plumbi Subacetatis Dilutus.**
- „ **Potassiae Permanganatis.**
- „ **Sodæ Arseniatis.**
- „ **Zinci Chloridi.**

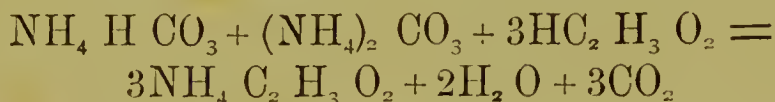
We will study consecutively the mode and *rationale* of

preparation, the strength, specific gravity, character, and tests of the foregoing—

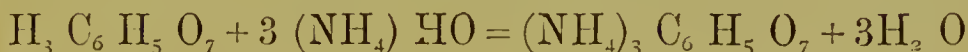
Preparation.

Liquor Ammoniac Acetatis.—This is commonly known as “Mindererus’s Spirit,” and is a solution of acetate of ammonia ($\text{NH}_4 \text{C}_2 \text{H}_3 \text{O}_2$) in water. It is made by adding gradually powdered carbonate of ammonia to 10 fluid ounces of acetic acid until a neutral solution is formed, and then adding $2\frac{1}{2}$ pints of water.

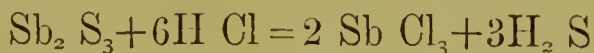
The following is the reaction which takes place :—



Liquor Ammonia Citratis is a solution of citrate of ammonia ($\text{NH}_4)_3 \text{C}_6 \text{H}_5 \text{O}_7$) in water. It is made by adding to a solution of 3 ounces of citric acid in 1 pint of water strong solution of ammonia until the liquid is neutral to test paper. The reaction is expressed thus :—



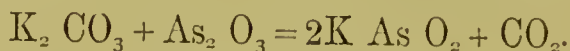
Liquor Antimonii Chloridi.—This, which is often known as “Butter of Antimony,” is a solution of terchloride of antimony (SbCl_3) in hydrochloric acid. It is prepared by dissolving 1 pound of black antimony ($\text{Sb}_2 \text{S}_3$) by the aid of heat in 4 pints of hydrochloric acid, and boiling down to the bulk of 2 pints.



During the reaction the materials are directed to be placed beneath a flue with a good draught, in order to carry off the sulphuretted hydrogen gas.

Liquor Arsenicalis.—Commonly known as “Fowler’s Solution.” It is made by dissolving by the aid of heat, 20 grains each of arsenious acid and carbonate of potash in 10 ounces of water ; when cool, adding 5 drachms of compound tincture of lavender, and finally adding distilled water to make up the bulk to 1 pint. The solution of arsenious acid in water is facilitated by the presence of the alkaline carbonate, which is slowly decomposed by it. The officinal

solution therefore contains a small quantity of arsenite of potash,—



The compound tincture of lavender is merely added as a colouring and flavouring agent in order to prevent mistakes.

Liquor Arsenici Hydrochloricus.—Made by boiling 80 grains of arsenious acid with 2 drachms of hydrochloric acid and 4 ounces of water until it is dissolved, and then adding water to make up the bulk to 1 pint (a).

Liquor Bismuthi et Ammoniae Citratis.—Mix 2 ounces of nitric acid with 1 ounce of water, and add 430 grains of pure bismuth in successive portions. When effervescence ceases heat moderately for 10 minutes and then decant. Evaporate to 2 ounces, and add 2 ounces of citric acid dissolved in 4 ounces of water. Add gradually solution of ammonia until the precipitate at first formed is dissolved, and the solution is neutral or slightly alkaline. Dilute with water to 1 pint.

In the above process trinitrate of bismuth is first formed; on adding ammonia to this, oxide of bismuth would be precipitated, were it not that by the previous addition of citric acid, citrate of ammonia is formed in which oxide of bismuth is freely soluble. The nitric acid, which is set free, is saturated by the excess of ammonia present, and hence the liquor contains nitrate of ammonia, as well as citrate of bismuth and ammonia. It differs somewhat from the celebrated “Schacht’s Solution of Bismuth.”

Liquor Ferri Perchloridi Fortior.—An aqueous solution of perchloride of iron ($\text{Fe}_2 \text{Cl}_6$). Dissolve 2 ounces of iron

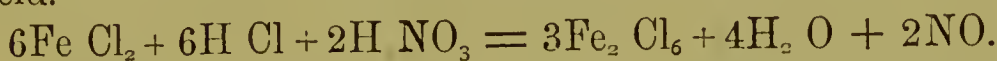
(a) We may here mention another arsenical liquor which, although not now officinal, was in the *Dublin Pharmacopœia*, and is still so very generally used as to warrant special notice—viz., *Liquor Arsenici et Hydrargyri Hydriodatis*, or “Donovan’s Solution.” It is made by triturating together 6 grains of arsenic, 16 grains of mercury, $50\frac{1}{2}$ grains of iodine, and $\frac{1}{2}$ drachm of alcohol, until a dry mass is obtained; this is then rubbed with 8 ounces of water in successive portions, and then heated to ebullition; when the solution has cooled it is filtered, and as much water is added as will make up the bulk to 8 ounces and 6 drachms. In this preparation the iodine combines with the arsenic forming the teriodide (As I_3), and with the mercury forming the periodide (Hg I_2). One fluid drachm of it contains 1-12th grain of arsenic, 1-4th of mercury, and 3-4ths grain of iodine.

wire in a mixture of 8 ounces each of hydrochloric acid and water by the aid of a gentle heat. Filter, add 4 ounces of hydrochloric acid and 9 drachms of nitric acid, and heat until red fumes are evolved, and the liquid becomes orange brown. Evaporate down to 10 ounces.

The first stage in the above process is the formation of protochloride of iron by the action of hydrochloric acid on the iron wire.



This protochloride (containing excess of hydrochloric acid) is then converted into perchloride by the action of nitric acid.



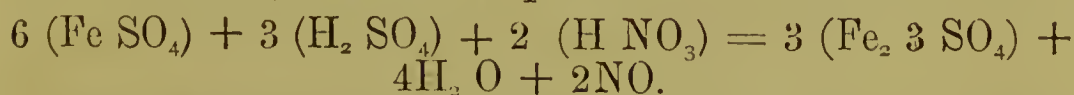
Liquor Ferri Perchloridi.—Made by diluting 1 part of the strong solution with 3 parts of water.

Liquor Ferri Pernitratis.—An aqueous solution of pernitrates of iron ($\text{Fe}_2 6\text{NO}_3$). Dissolve 1 ounce of iron wire in a mixture of $4\frac{1}{2}$ ounces of nitric acid and 16 ounces of water, moderating the action if necessary, by adding more water. Filter, and add water to $1\frac{1}{2}$ pints. In the reaction which ensues pernitrates of iron is formed, water is produced, and nitric oxide evolved.



Liquor Ferri Persulphatis.—An aqueous solution of persulphate of iron ($\text{Fe}_2 3\text{SO}_4$). Dissolve 8 ounces of sulphate of iron in a mixture of 6 drachms of sulphuric acid and 10 ounces of water by the aid of heat. Add 6 drachms of nitric acid diluted with 2 ounces of water. Concentrate by boiling until the mixture changes from black to red. As long as the solution gives a blue precipitate with red prussiate of potash, add a few drops of nitric acid, and renew the boiling in order to convert all the sulphate into persulphate. When cold, add water up to 11 ounces.

When nitric acid is added to a solution of sulphate of iron in sulphuric acid, the proto is converted into the per-salt, and nitric acid is developed.

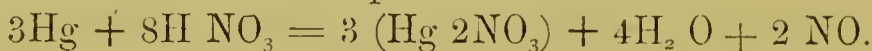


The nitric oxide is not at once evolved, but is absorbed

by, and blackens any protosulphate which may be present. This black compound is afterwards decomposed.

Liquor Hydrargyri Nitratis Acidus.—A solution of pernitrate of mercury ($\text{Hg } 2\text{NO}_3$). Dissolve 4 ounces of mercury in a mixture of 5 ounces of nitric acid and $1\frac{1}{2}$ ounces of water without heat. Then boil gently for 15 minutes to ensure the formation of the pernitrate, and to cause the expulsion of the nitric oxide.

The reaction is thus expressed :—

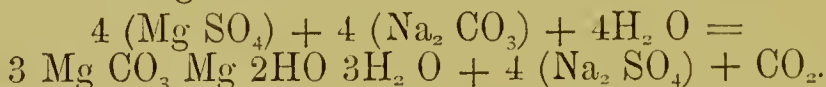


Liquor Hydrargyri Perchloridi.—An aqueous solution of the perchloride of mercury (Hg Cl_2). Dissolve 10 grains each of perchloride of mercury and chloride of ammonium in 1 pint of water.

The chloride of ammonium is to increase the solvent power of the water.

Liquor Magnesiæ Carbonatis.—To a solution of 2 ounce of sulphate of magnesia in $\frac{1}{2}$ pint of water heated to boiling point, add a solution of $2\frac{1}{2}$ ounces of carbonate of soda in $\frac{1}{2}$ pint of water. Boil until carbonic acid is no longer evolved. Collect the precipitated carbonate of magnesia on a filter, and wash until the washings give no precipitate with chloride of barium (absence of a sulphate). Mix the washed precipitate with 1 pint of water, and saturate it with washed carbonic acid gas passed in under slight pressure. Filter the liquid after 24 hours to remove any undissolved carbonate of magnesia, and again pass carbonic acid gas into the filtered solution. Preserve in a well-stoppered bottle.

The following is the reaction :—



In this reaction the water decomposes the carbonate of magnesia, some of the carbonic acid of which is given off, and a combination of a hydrate and a carbonate of magnesia results.

This solution resembles “Murray’s Fluid Magnesia.”

Liquor Plumbi Subacetatis, commonly known as “Goulard’s Extract.” Boil 5 ounces of acetate of lead and 3 ounces of oxide of lead in 1 pint of distilled water for half

an hour. Filter, and when cold add water up to 20 ounces. Keep in stoppered bottles. The acetate of lead combines with the oxide of lead to form a mixture of oxyacetates, which is collectively known as the subacetate, thus,—



Liquor Plumbi Subacetatis Dilutus, commonly known as “Goulard Water.” Mix 2 drachms each of solution of subacetate of lead and rectified spirit, with 19½ ounces of distilled water; filter and keep in a stoppered bottle.

If this preparation be not made with distilled water it becomes milky from the formation of other salts of lead, as the carbonate and sulphate.

Liquor Potassæ Permanganatis.—Similar to, but half the strength of, “Condy’s Disinfecting Fluid.” Made by dissolving 80 grains of permanganate of potash (K Mn O_4) in 1 pint of distilled water.

Liquor Soda Arseniatis.—Dissolve 4 grains of arseniate of soda (rendered anhydrous by a heat not exceeding 300°) in 1 ounce of water.

Liquor Zinci Chloridi.—Represents “Sir W. Burnett’s Disinfecting Fluid.” Dissolve 1 pound of zinc in a mixture of 44 ounces of hydrochloric acid, and 1 pint of water by the aid of gentle heat until gas is no longer evolved. Boil for half an hour, add water to supply the loss by evaporation, cool, filter. Add solution of chlorine gradually with frequent agitation, until a permanent odour of chlorine is acquired by the liquid. Add ½ ounce of carbonate of zinc gradually until a brown sediment appears. Filter, and evaporate down to 2 pints.

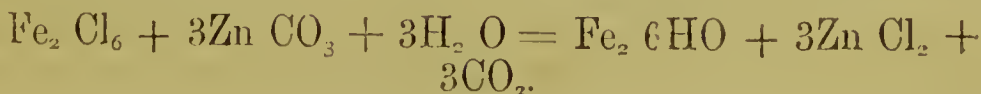
The following is the reaction :—



The object of the chlorine is to free the zinc from iron by converting the latter into perchloride, thus—



This perchloride is then, by the action of carbonate of zinc, converted into the brown peroxide and is precipitated as such, thus—



Strength.

<i>L. Arsenicalis</i>	...	...	...	...	} 1 in 120 (4 grains to the ounce).
<i>L. Arseniei Hydrochloricus</i>	...	...	...	...	
<i>L. Sodæ Arseniatis</i>	...	...	...	...	
<i>L. Potassæ Permanganatis</i>	...	...	...	...	
<i>L. Ferri Perchloridi Fortior</i>	...	...	...	...	1 in 1.
<i>L. Ferri Perchloridi</i>	...	...	...	...	1 in 4.
<i>L. Ferri Pernitratidis</i>	...	...	...	...	1 in 6.
<i>L. Magnesicæ Carbonatis</i>	...	...	...	...	1 in 37.
<i>L. Plumbi Subacetatis Dilutus</i>	...	...	...	...	1 in 80.
<i>L. Hydrargyri Perchloridi</i>	...	...	...	...	1 in 960.

Liquor Magnesicæ Carbonatis contains 13 grains of carbonate in the fluid ounce; one fluid ounce of *Liquor Bismuthi et Ammoniac Citratis* contains 24 grains of oxide of bismuth; and one fluid ounce of *Liquor Zinci Chloridi* contains 366 grains of chloride of zinc.

Specific Gravity.

The Pharmacopœia mentions the following :—

<i>L. Antimoni Chloridi</i>	...	...	...	...	1·47
<i>L. Arsenicalis</i>	...	...	...	...	1·009
<i>L. Arseniei Hydrochloricus</i>	...	...	...	...	1·009
<i>L. Bismuthi et Ammonia Citratis</i>	...	...	...	...	1·122
<i>L. Ferri Perchloridi Fortior</i>	...	...	...	...	1·338
<i>L. Ferri Pernitratidis</i>	...	...	...	...	1·107
<i>L. Ferri Persulphatis</i>	...	...	...	...	1·441
<i>L. Hydrargyri Nitratidis</i>	...	...	...	...	2·246
<i>L. Plumbi Subacetatis</i>	...	...	...	...	1·26

Tests, &c.

Liquor Antimonii Chloridi.—A yellowish red liquid. A little of it dropped into water gives a white precipitate (of oxychloride of antimony, or “Algarothi’s Powder,” which is a variable mixture of terchloride and teroxide), the solution filtered from this precipitate gives with nitrate of silver a copious precipitate (of chloride of silver). If the white precipitate of oxychloride be treated with sulphuretted hydrogen, it becomes orange red (by formation of the tersulphide).

One fluid drachm mixed with a solution of $\frac{1}{4}$ ounce of tartaric acid in 4 ounces of water gives a clear solution, which, when treated with sulphuretted hydrogen, yields an

orange precipitate (Sb_2S_3), weighing, when washed and dried at 212° , 22 grains.

Liquor Arsenicalis.—A reddish alkaline liquid. After acidulation with hydrochloric acid, it gives with sulphuretted hydrogen a yellow precipitate (tersulphide). One fluid ounce (441.5 grains by weight), boiled for five minutes with 10 grains of bicarbonate of soda, and when cold, diluted with 6 ounces of water containing a little mucilage of starch, does not give with the Volumetric Solution of Iodine a permanent blue colour, until 808 grain-measures have been added, corresponding to 4 grains of arsenious acid. In this test, the oxygen of the soda converts the arsenious acid into arsenic acid, and the iodine combines with the sodium to form iodide of sodium. Until all the arsenious acid is converted into arsenic acid, sodium will be free for combination with iodine, which cannot therefore give the characteristic colour with starch.

Liquor Arsenici Hydrochloricus.—A colourless liquid with an acid reaction. The same quantitative test is directed for this solution as for *Liquor Arsenicalis*, using, however, 20 grains of bicarbonate of soda.

Liquor Bismuthi et Ammoniae Citratis.—Mixes with water without decomposition. Heated with solution of potash, it evolves ammonia and yields a white precipitate. On the addition of hydrochloric acid, it gives a white precipitate (oxide of bismuth), which is soluble in excess.

Three fluid drachms mixed with an ounce of water and treated with excess of sulphuretted hydrogen, gives a black precipitate (sulphide of bismuth), which, washed and dried, weighs 9.92 grains.

Liquor Ferri Perchloridi Fortior.—An orange brown liquid with a strong styptic taste. Diluted with water it gives a white precipitate with nitrate of silver (chloride of silver), and a dark blue precipitate, with ferro-cyanide of potassium (characteristic of a per-salt of iron), but no precipitate with ferrid-cyanide of potassium (showing the absence of a proto-salt of iron).

One fluid drachm mixed with two ounces of water gives, on adding excess of solution of ammonia, a reddish brown precipitate (of peroxide of iron), which, washed and incinerated, weighs 15.62 grains.

Liquor Ferri Pernitratis.—A reddish brown liquid with a slight astringent taste. It gives a blue precipitate with ferro-cyanide of potassium (presence of a per-salt), but no precipitate with ferrid-cyanide of potassium (absence of proto-salt). When to a little of it, placed in a test-tube, half its volume of pure sulphuric acid is added, and then solution of sulphate of iron is poured on, the whole assumes a dark brown colour (due to the absorption by the solution of the sulphate of iron of nitric oxide gas, which is produced by the decomposition of the nitric acid set free by the action of the sulphuric acid).

One fluid drachm treated with excess of solution of ammonia, gives a precipitate (of peroxide), which, washed, dried, and incinerated, weighs 2·6 grains.

Liquor Ferri Persulphatis.—A dark red liquid with a very astringent taste. Diluted with 10 volumes of water it gives a white precipitate, with chloride of barium (presence of a sulphate), a blue precipitate with ferro-cyanide of potassium (presence of a per-salt), but no precipitate with ferrid-cyanide of potassium (absence of proto-salt).

One fluid drachm diluted with two ounces of water and treated with excess of solution of ammonia, gives a precipitate (of peroxide), which, washed and incinerated, weighs 11·44 grains.

Liquor Hydrargyri Nitratis Acidus.—Gives a yellow precipitate with excess of solution of potash (indicating mercuric oxide HgO). If a crystal of sulphate of iron be dropped into it, in a little time the salt of iron and the liquid in its vicinity acquire a dark colour (due to the conversion of a portion of the sulphate of iron into a state of persulphate by nitric acid, and the absorption of the nitric oxide so produced by the remaining portion of the sulphate). It gives no precipitate when a little of it is dropped into hydrochloric acid diluted with twice its volume of water (showing the absence of sub-nitrate, for if that were present sub-chloride of mercury would be formed, and this, being insoluble, would be precipitated).

Liquor Magnesiæ Carbonatis.—One fluid ounce evaporated to dryness yields a white solid residue, which, when calcined, weighs not less than 5 grains, is insoluble in water, and answers to the tests for magnesia.

Liquor Plumbi Subacetatis.—A colourless liquid with an alkaline reaction and a sweet astringent taste. It becomes turbid on exposure (by absorption of carbonic acid and consequent formation of carbonate of lead). It forms with mucilage of gum arabic an opaque white jelly. Gives with excess of sulphuric acid, a white precipitate (sulphate of lead), acetic acid being set free.

Six fluid drachms (413·3 grains by weight), require for perfect precipitation 810 grain measures of the Volumetric Solution of Oxalic Acid.

Of the foregoing liquors : *Liquor Ferri Perchloridi Fortior* enters into the composition of *Liquor Ferri Perchloridi* and *Tinctura Ferri Perchloridi* ; *Liquor Ferri Persulphatis* is used in the preparation of *Ferri et Ammoniae Citras*, *Ferri et Quiniae Citras*, *Ferri Oxidum Magneticum*, *Ferri Peroxidum Humidum*, *Ferrum Tartaratum*, and *Tinctura Ferri Acetatis* ; *Liquor Plumbi Subacetatis* is contained in *Liquor Plumbi Subacetatis Dilutus*, and *Unguentum Plumbi Subacetatis Compositum*.

CLASS VI.

SOLUTIONS OF ALKALOIDS AND THEIR SALTS.

Liquor Atropiæ.

- „ **Atropiæ Sulphatis.**
- „ **Morphiæ Acetatis.**
- „ **Morphiæ Hydrochloratis.**
- „ **Strychniæ.**

Liquor Atropiæ.—Dissolve 4 grains of atropia in 1 drachm of rectified spirit, and add this gradually to 7 drachms of water.

Liquor Atropiæ Sulphatis.—Dissolve 4 grains of sulphate of atropia in 1 ounce of water.

Liquor Morphiæ Acetatis.—Dissolve 4 grains of acetate of morphia in a mixture of 8 minims of dilute acetic acid, 2 drachms of rectified spirit, and 6 drachms of water.

Liquor Morphiæ Hydrochloratis.—Dissolve 4 grains of hydrochlorate of morphia in a mixture of 8 minims of dilute hydrochloric acid, 2 drachms of rectified spirit, and 6 drachms of water.

Liquor Strychniæ.—Dissolve 4 grains of strychnia in a

mixture of 6 minims of dilute hydrochloric acid, and 4 drachms of water by the aid of heat, and then add 2 drachms of rectified spirit and 2 drachms of water.

It will be seen that all the solutions in this group have the same strength, viz.—1 in 120 or 4 grains in the fluid ounce.

The use of the rectified spirit in the last three liquors is to prevent decomposition, that of the acid is to aid solution. *Liquor Strychnie* is in reality a solution of the hydrochlorate.

The only liquor of which we have not yet spoken, and which is not referable to any of the foregoing groups is—

Liquor Epispasticus.

This “Blistering liquid,” or, as it was formerly named, *Linimentum Cantharides*, is prepared by macerating 8 ounces of cantharides in 4 ounces of acetic acid for 24 hours, and then percolating the mixture with ether until 20 ounces are obtained.

LOTIONES (LOTIONS).

Of these there are but two, viz.—

Lotio Hydrargyri Flava.

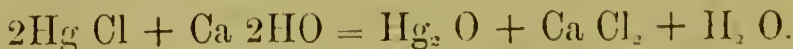
„ **Hydrargyri Nigra.**

They are prepared by mixing 18 grains of perchloride of mercury, and 30 grains of subchloride of mercury respectively, with 10 ounces of solution of lime.

In the preparation of *Lotio Flava*, yellow or mercuric, oxide (Hg O) is precipitated, thus—



while in *Lotio Nigra*, black, or mercurous, oxide ($\text{Hg}_2 \text{O}$) is thrown down—



These lotions are commonly known as “yellow wash” and “black wash.”

MELLITA (HONEYES).

Including the oxymels there are four formulæ for the preparation of honeys, viz. —

Mel Depuratum.

„ **Boracis.**

Oxymel.

„ **Scillæ.**

Mel Depuratum, clarified honey, is made by melting honey in a water-bath, and straining it while hot through flannel moistened with warm water. The honey is thus rendered less liable to ferment by the removal of the flocculent matters and other impurities.

Mel Boracis is a mixture of 64 grains of powdered borax in 1 ounce of clarified honey.

Oxymel is prepared by mixing 40 ounces of melted clarified honey with 5 ounces each of acetic acid and water.

Oxymel Scillæ is made by evaporating in a water-bath, until the specific gravity of 1.32 is attained, a mixture of 1 pint of vinegar of squill and 2 pounds of clarified honey.

Mel Depuratum, besides forming an ingredient of the foregoing honeys, enters also into the composition of Confectio Piperis, Confectio Scammonii, and Confectio Terebinthinæ.

MISTURÆ (MIXTURES).

The majority of these are preparations containing substances suspended in aqueous fluids by means of sugar, gum arabic, yolk of egg, &c. When the suspended substances are oleaginous, an “emulsion” is formed.

The following are the mixtures of the Pharmacopœia :—

Mistura Ammoniâci.

„ **Amygdalæ.**

„ **Creasoti.**

„ **Cretæ.**

„ **Ferri Aromatica.**

„ **Ferri Composita.**

„ **Gentianæ.**

„ **Guaiaci.**

„ **Scammonii.**

„ **Sennæ Composita.**

„ **Spiritus Vini Gallici.**

Mistura Ammoniaci.—Triturate $\frac{1}{4}$ ounce of ammoniacum with 8 ounces of water gradually added, and strain through muslin. The water dissolves the gum of the gum-resin, and thus the resin becomes suspended, forming an emulsion of a milky appearance.

Mistura Amygdalæ.—Triturate $2\frac{1}{2}$ ounces of compound powder of almonds with 1 pint of water, and strain through muslin. The oleaginous matter of the almonds is suspended in the water by their albumen and by the gum and sugar which are contained in the compound powder, and thus a milk-like emulsion is formed.

Mistura Scammonii.—Triturate 4 grains of resin of scammony, with 2 fluid ounces of milk gradually added. This is an imitation of "Planche's Purgative Potion."

Mistura Guaiaci.—Triturate $\frac{1}{2}$ ounce of guaiacum resin with $\frac{1}{2}$ ounce of refined sugar and $\frac{1}{4}$ ounce of gum acacia, and add gradually 1 pint of cinnamon-water. An emulsion is formed by the suspension of the resin by means of the sugar and gum.

Mistura Cretæ.—Triturate $\frac{1}{4}$ ounce each of prepared chalk and powdered gum acacia with $7\frac{1}{2}$ ounces of cinnamon-water, and add $\frac{1}{2}$ ounce of syrup.

Mistura Spiritus Vini Gallici.—Rub the yolks of two eggs with $\frac{1}{2}$ ounce of refined sugar, and add 4 ounces each of spirit of French wine and cinnamon-water.

Mistura Creasoti.—Mix 16 minims each of creasote and glacial acetic acid, add 15 ounces of water, and then 1 ounce of syrup and $\frac{1}{2}$ drachm of spirit of juniper. The acetic acid is employed to promote the solubility of the creasote, and the spirit of juniper is to mask the taste. One ounce contains 1 minim of creasote.

Mistura Sennæ Composita.—Dissolve, with the aid of gentle heat, 4 ounces of sulphate of magnesia and $\frac{1}{2}$ ounce of extract of liquorice in 14 ounces of infusion of senna, add $2\frac{1}{2}$ ounces of tincture of senna and 10 drachms of compound tincture of cardamom, and make up the bulk to 1 pint with infusion of senna.

This is intended to resemble "Black Draught."

Mistura Gentianæ.—Macerate $\frac{1}{2}$ ounce of gentian root and 30 grains each of bitter orange peel and bruised

coriander fruit in 2 ounces of proof spirit for two hours, add 8 ounces of water, and macerate for two hours more; finally, strain through calico.

This was the Infusum Gentianæ Compositum of the B.P., 1864, and of Edinburgh.

Cold water is used, as it dissolves less of the pectin or mucilaginous matter of the gentian, and spirit is used to promote the solubility of the principle gentisin.

Mistura Ferri Aromatica.—Macerate 1 ounce of powdered pale cinchona bark, $\frac{1}{2}$ ounce of powdered calumba root, $\frac{1}{4}$ ounce of bruised cloves, and $\frac{1}{2}$ ounce of fine iron wire, in 12 ounces of peppermint water for three days; filter, and add as much peppermint water to the filter as will make the product measure $12\frac{1}{2}$ ounces, then add 3 ounces of compound tincture of cardamom and $\frac{1}{2}$ ounce of tincture of orange peel.

This is commonly known as “Heberden’s Ink.” It contains *tannate* of iron.

Mistura Ferri Composita.—Take $9\frac{1}{2}$ ounces of rose water, triturate with a little of it so as to form a thin paste, 60 grains each of myrrh and refined sugar, and 30 grains of carbonate of potash; add to this 4 drachms of spirit of nutmeg and more of the rose water until 8 ounces of a milky liquid is formed; then add 25 grains of sulphate of iron dissolved in the remainder of the rose water; mix well and preserve immediately from the air.

This is an imitation of “Griffith’s Mixture.”

The following reaction takes place in the preparation:—



More carbonate of potash is employed than is required to effect the decomposition of the sulphate of iron, and the excess forms with the myrrh a saponaceous compound which serves to suspend the carbonate of iron. When first made it is of a greenish colour, owing to the presence of the hydrated ferrous carbonate; but it becomes reddish when exposed, owing to the absorption of oxygen which peroxidises the iron, carbonic acid being evolved. The sugar materially helps in retarding this oxidation.

MUCILAGINES (MUCILAGES).

These are :—

Mucilago Acaciæ.

„ **Amyli.**

„ **Tragacanthæ.**

The first is made by dissolving 4 ounces of gum arabic in 6 ounces of water.

Mucilago Amyli is made by triturating 120 grains of starch with 10 ounces of water added gradually, and then boiling for a few minutes with stirring.

Mucilago Tragacanthæ is prepared by shaking up 60 grains of powdered tragacanth with 10 ounces of water.

In order to render oils or resinous tinctures emulsive with aqueous fluids, 3 drachms of mucilage of acacia are required for 1 ounce, while 10 drachms are required to emulsify 1 ounce of copaiba (*Squire*).

Mucilago Acaciæ becomes sour on keeping by the formation of acetic acid.

Mucilago Amyli is not strictly a solution, the starch being merely in a “state of excessive hydration.”

Mucilage of gum acacia is an ingredient of all the lozenges, except those of opium; mucilage of starch forms the basis of all the enemata, except the enema of assafœtida and that of tobacco.

OLEA (OILS).*

These are distilled or expressed; they are enumerated in the following table :—

CLASS I.

DISTILLED OILS.

(a) *From the fresh flowering herb.*

Oleum Menthæ Piperitæ.

„ **Menthæ Viridis.**

„ **Rutæ.**

* The further consideration of the Oils is reserved for the Author's forthcoming “Tablets of Materia Medica.”

(b) *From the fresh tops.*

Oleum Sabinæ.

(c) *From the leaves.*

Oleum Cajuputi.

(d) *From the bark.*

Oleum Cinnamomi.

(e) *From the oleo-resin.*

Oleum Copaibæ.

„ **Terebinthinæ.**

(f) *From the flower.*

Oleum Anthemidis.

„ **Caryophylli** (bud).

„ **Lavandulæ.**

„ **Rosmarini** (flowering tops).

(g) *From the fruit.*

Oleum Anethi.

„ **Anisi.**

„ **Carui.**

„ **Coriandri.**

„ **Cubebæ.**

„ **Juniperi.**

„ **Pimentæ.**

(h) *From the seed-kernel.*

Oleum Myristicæ.

(i) *Distilled with water from the seed after expression of the fixed oil.*

Oleum Sinapis.

CLASS II.

EXPRESSED OILS.

(a) *From the fresh peel.*

Oleum Limonis.

This oil is sometimes distilled.

(b) *From the fruit.*

Oleum Olivæ.

(c) *From the seeds.*

Oleum Amygdalæ.

„ **Crotonis.**

„ **Lini.**

„ **Myristicæ Expressum.**

„ **Ricini.**

„ **Theobromæ.**

Heat is employed in the expression of *Oleum Theobromæ* and *Oleum Myristicæ Expressum*.

Oleum Morrhue is extracted from the fresh liver of *Gadus Morrhua* by a heat not exceeding 180°.

The following are the preparations into the composition of which the oils enter :—

Oleum Amygdalæ in Unguentum Cetacei, Unguentum Hydrargyri Oxidi Rubri, Unguentum Plumbi Subacetatis Compositum, Unguentum Simplex.

Oleum Anisi in Essentia Anisi, Tinctura Camphoræ Compositæ, Tinctura Opii Ammoniata.

Oleum Anthemidis in Extractum Anthemidis.

Oleum Cajeputi in Linimentum Crotonis, and Spiritus Cajeputi.

Oleum Carui in Confectio Scammonii, and Pilula Aloes Barbadensis.

Oleum Caryophylli in Confectio Scammonii, Pilula Colocyntidis Composita, and Pilula Colocyntidis et Hyoscyami.

Oleum Coriandri in Syrupus Sennæ.

Oleum Crotonis in Linimentum Crotonis.

Oleum Juniperi in Spiritus Juniperi.

Oleum Lavandulæ in Linimentum Camphoræ Compositum, Spiritus Lavandulæ, and Tinctura Lavandulæ Composita.

Oleum Limonis in Linimentum Potassii Iodidi cum Saponem, and Spiritus Ammoniæ Aromaticus.

Oleum Menthæ Piperitæ in Aqua Menthæ Piperitæ, Essentia Menthæ Piperitæ, Pilula Rhei Compositus and Spiritus Menthæ Piperitæ.

Oleum Menthæ Viridis in Aqua Menthæ Viridis.

Oleum Myristicæ in Pilula Aloes Socotrinæ, Spiritus Ammoniæ Aromaticus, and Spiritus Myristicæ.

Oleum Myristicæ Expressum in Emplastrum Calefaciens, and Emplastrum Picis.

Oleum Olivæ in Charta Epispastica, Cataplasma Lini, Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Cerati Saponis, Emplastrum Hydrargyri, Emplastrum Picis.

Emplastrum Plumbi, Enema Magnesiæ Sulphatis, Linimentum Ammoniaë, Linimentum Calcis, Linimentum Camphoræ, Unguentum Cantharidis, Unguentum Hydrargyri Compositum, Unguentum Hydrargyri Nitratis, and Unguentum Veratriæ.

Oleum Ricini in Collodium Flexile, Linimentum Sinapis Compositum, and Pilula Hydrargyri Sub-chloridi Composita.

Oleum Rosmarini in Linimentum Saponis, Spiritus Rosmarini, and Tinctura Lavandulæ Composita.

Oleum Sinapis in Linimentum Sinapis Compositum.

Oleum Terebinthinæ in Confectio, Enema, Linimentum, and Unguentum Terebinthinæ, and Linimentum Terebinthinæ Aceticum.

Oleum Theobromæ in all the suppositories.

PILULÆ (PILLS).

There are no less than twenty formulæ for the preparation of these, viz. :—

Pilula Aloes Barbadensis.

- „ Aloes Socotrinæ.
- „ Aloes et Assafœtidæ.
- „ Aloes et Ferri.
- „ Aloes et Myrrhæ.
- „ Assafœtida Composita.
- „ Cambogiæ Composita.
- „ Colocynthis Composita.
- „ Colocythidis et Hyoscyami.
- „ Conii Composita.
- „ Ferri Composita.
- „ Ferri Carbonatis.
- „ Ferri Iodidi.
- „ Hydrargyri.
- „ Hydrargyri Sub-chloridi Composita.
- „ Ipecacuanhæ cum Scilla.
- „ Plumbi cum Opio.
- „ Quiniæ.
- „ Rhei Composita.
- „ Saponis Composita.
- „ Scillæ Composita.

All the pills consist of several ingredients, and yet there is no satisfactory method of classifying them pharmaceutically. We will therefore consider them in alphabetical order, directing the special attention of the student to the ingredients and strength of these important preparations.

Pilula Aloes Barbadosis (1 in 2) :

Barbadoes aloes, 2 oz. ; hard soap, 1 oz. ; oil of carraway, 1 dr. ; confection of roses, 1 oz.

Pilula Aloes Socotrine (1 in 2) :

Socotrine aloes, 2 oz. : hard soap, 1 oz. ; oil of nutmeg, 1 dr. ; confection of roses. 1 oz.

Pilula Aloes et Assafœtidæ (1 of aloes and 1 of assafœtida in 4) :

Socotrine aloes, assafœtida, hard soap, and $\frac{1}{2}$ confection of roses ; of each 1 oz.

Pilula Aloes et Ferri (1 of aloes, and $\frac{3}{4}$ of iron in $5\frac{1}{4}$) :

Sulphate of iron, $1\frac{1}{2}$ oz. ; Barbadoes aloes, 2 oz. ; compound powder of cinnamon, 3 oz. ; confection of roses, 4 oz.

Pilula Aloes et Myrrhæ, “Rufus Pill” (1 of aloes and $\frac{1}{2}$ of myrrh in 3) :

Socotrine aloes, 2 oz. ; myrrh, 1 oz. ; saffron, $\frac{1}{2}$ oz. ; confection of roses, $2\frac{1}{2}$ oz.

Pilula Assafœtidæ Composita (1 of assafœtida, and 1 of galbanum in $3\frac{1}{2}$) :

Assafœtida, galbanum, and myrrh, of each 2 oz ; treacle, 1 oz.

Pilula Cambogiæ Composita (1 in 6) :

Gamboge, Barbadoes aloes, and compound powder of cinnamon, of each 1 oz. ; hard soap, 2 oz. ; and a sufficiency of syrup.

Pilula Colocynthis Composita (1 of colocynth, 2 of aloes, and 2 of scammony in 6) :

Colocynth, 1 oz. ; Barbadoes aloes, 2 oz. ; scammony, 2 oz. ; sulphate of potash, $\frac{1}{4}$ oz. ; oil of cloves, 2 dr. ; water, a sufficiency.

Pilula Colocynthis et Hyoscyami :

Compound pill of colocynth, 2 oz. ; extract of hyoscyamus, 1 oz.

Pilula Conii Composita ($2\frac{1}{2}$ of extract, and $\frac{1}{2}$ of ipecacuanha in 3) :

Extract of hemlock, $2\frac{1}{2}$ oz. ; ipecacuanha, $\frac{1}{2}$ oz. ; and a sufficiency of treacle.

Pilula Ferri Carbonatis (1 of saccharo-carbonate in $1\frac{1}{4}$) :

Saccharated carbonate of iron, 1 oz. ; confection of roses, $\frac{1}{4}$ oz.

Pilula Ferri Iodidi (1 of iodide of iron in 3) :

Fine iron wire, 40 grs. iodine, 80 grs. ; refined sugar, 70 grs. ; liquorice root, 140 grs. : and distilled water, 50 mins.

Pilula Hydrargyri, “Blue Pill” (1 of mercury in 3) :

Mercury, 2 oz. ; confection of roses, 3 oz. ; liquorice root, 1 oz.

Pilula Hydrargyri Sub-chloridi Composita, “Plummer’s Pill” (1 of calomel in 5) :

Calomel, 1 oz. ; sulphuretted antimony, 1 oz. ; guaiacum resin, 2 oz. ; castor oil, 1 oz.

Pilula Ipecacuanhæ cum Scilla (3 of Dover’s powder in 7) :

Compound powder of ipecacuanha, 3 oz. ; squill, 1 oz. ; ammoniacum, 1 oz. ; and a sufficiency of treacle.

Pilula Plumbi cum Opio (6 of acetate of lead, and 1 of opium in 8) :

Acetate of lead, 36 grs. ; opium, 6 grs. ; confection of roses, 6 grs.

Pilula Quinice (3 of quinine in 4) :

Sulphate of quinine, 60 grs. ; confection of hips, 20 grs.

Pilula Rhei Composita (1 of rhubarb, $\frac{3}{4}$ of aloes in $4\frac{1}{2}$) :

Rhubarb, 3 oz. ; socotrine aloes, $2\frac{1}{4}$ oz. ; myrrh, $1\frac{1}{2}$ oz. ; hard soap, $1\frac{1}{2}$ oz. ; oil of peppermint, $1\frac{1}{2}$ drs. ; treacle, 4 oz.

Pilula Saponis Composita (1 of opium in 5) :

Opium, $\frac{1}{2}$ oz. ; hard soap, 2 oz. ; water, a sufficiency.

Pilula Scillæ Composita (1 of squills in 5) :

Squill, $1\frac{1}{4}$ oz. ; ginger, ammoniacum, and hard soap, of each 1 oz. ; treacle, 2 oz.

With regard to the *directions* for the preparation of the foregoing pills, the solid ingredients are to be powdered previously to being mixed, and as a general rule the simple direction is to mix the ingredients thoroughly so as to form an uniform mass. In the preparation of *Pilula Assafoetidæ Composita*, however, the ingredients are to be heated in a water-bath, and the mass stirred until it assumes an uniform consistence. In *Pilula Ferri Iodidi* the iron is to be agitated with the iodine and the water, until the froth becomes white, the fluid is then to be poured on the sugar in a mortar, rubbed briskly, and the liquorice gradually added. In the *Pilula Hydrargyri*, the efficacy of the pill depends on the degree of extinction of the mercury, and hence we must be careful to rub the mercury with the confection of roses until the metallic globules are no longer visible ; the liquorice is then to be added and well mixed.

Pilula Hydrargyri probably consists of minutely divided metallic mercury combined with mercurous oxide (Hg_2O). It sometimes contains sub-sulphate of mercury as an adulteration, from the fact of sulphuric acid having been added to the confection of roses to improve its colour ; it is detected by rubbing the pill-mass with boiling water, and adding solution of nitrate of baryta—a white precipitate, insoluble in nitric acid, resulting.

Pilula Hydrargyri Sub-chloridi Composita becomes partially decomposed by long keeping, chloride of antimony and sulphuret of mercury resulting.

In *Pilula Plumbi cum Opio* which is an imitation of “Graves’s Pill,” a decomposition is also said to take place, acetate of morphia and meconate of lead being formed.

PULVERES (POWDERS).

There are thirteen in the Pharmacopœia, viz. :

- Pulvis Amygdalæ Compositus.**
 „ **Antimonialis.**
 „ **Catechu Compositus.**
 „ **Cinnamomi Compositus.**
 „ **Cretæ Aromaticus.**
 „ **Cretæ Aromaticus cum Opio.**
 „ **Ipecacuanhæ Compositus.**
 „ **Jalapæ Compositus.**
 „ **Kino Compositus.**
 „ **Opii Compositus.**
 „ **Rhei Compositus.**
 „ **Scammonii Compositus.**
 „ **Tragacanthæ Compositus.**

All these are of complex constitution, and as there is no satisfactory method of classifying them pharmaceutically, they had best be considered in alphabetical order.

Pulvis Amygdalæ Compositus (8 in 13).

Blanched Jordan almonds, 8 oz. ; refined sugar, 4 oz. ; gum acacia, 1 oz.

This was formerly the “*Confectio Amygdalæ*.” One oz. of it with 8 oz. of water forms the *Mistura Amygdalæ* of the present Pharmacopœia.

Pulvis Antimonialis (1 of Oxide of antimony in 3) :

Oxide of antimony, 1 oz. ; precipitated phosphate of lime, 2 oz.

Intended as a substitute for “James’s Powder,” of which, however, antimonious acid makes up the bulk.

Pulvis Catechu Compositus (1 in $2\frac{1}{2}$) :

Pale catechu, 4 oz. ; kino and rhatany root, of each, 2 oz. ; cinnamon bark and nutmeg, of each, 1 oz.

Pulvis Cinnamomi Compositus (1 in 2) :

Cinnamon bark, cardamom seeds, and ginger, of each, 1 oz.

Pulvis Cretæ Aromaticus (1 in 4) :

Cinnamon bark, 4 oz. ; nutmeg and saffron, of each, 3 oz. ; cloves, $1\frac{1}{2}$ oz. ; cardamom seeds, 1 oz. ; refined sugar, 25 oz. ; prepared chalk, 11 oz.

This was the “*Confectio Aromatica*” of L. P., from which it differs, however, in containing in 100 grains 22, instead of 34 of chalk, and 25 instead of 16 of aromatics.

Pulvis Cretæ Aromaticus cum Opio (1 of opium in 40) :

Aromatic powder of chalk, $9\frac{3}{4}$ oz. ; opium, $1\frac{1}{4}$ oz.

Pulvis Ipecacuanhæ Compositus (1 of opium in 10) :

Ipecacuanha and opium, of each, $\frac{1}{2}$ oz. ; sulphate of potash, 4 oz.

This is commonly known as “*Dover’s Powder*,” of which, however, it is not an exact imitation. The use of the sulphate of potash is to promote the minute division and intermixture of the opium and ipecacuanha. If this powder be kept for any length of time the bottle containing it should be well shaken before dispensing it, as the sulphate of potash is apt to sink to the bottom.

Pulvis Jalapæ Compositus (1 in 3) :

Jalap, 5 oz. ; acid tartrate of potash, 9 oz. ; ginger, 1 oz.

The acid tartrate of potash not only assists in the minute division of the jalap, but also promotes the hydragogue effects.

Pulvis Kino Compositus (1 of opium in 20) :

Kino, $3\frac{3}{4}$ oz. ; opium, $\frac{1}{4}$ oz. ; cinnamon bark, 1 oz.

Pulvis Opii Compositus (1 of opium in 10) :

Opium, $1\frac{1}{4}$ oz. ; black pepper, 2 oz. ; ginger, 5 oz. ; carraway fruit, 6 oz. ; tragacanth, $\frac{1}{2}$ oz.

Pulvis Rhei Compositus (1 in $4\frac{1}{2}$) :

Rhubarb root, 2 oz. ; light magnesia, 6 oz. ; ginger, 1 oz.

Known as “*Gregory’s Powder*.”

Pulvis Scammonii Compositus (1 in 2) :

Scammony, 4 oz. ; Jalap, 3 oz. ; ginger, 1 oz.

Pulvis Tragacanthæ Compositus :

Tragacanth, gum acacia, and starch, of each, 1 oz. ; refined sugar, 3 oz.

Chiefly used as a vehicle for heavy insoluble powders.

The general direction "to mix the ingredients thoroughly, pass the powder through a light sieve, rub it lightly in a mortar, and preserve it in a stoppered bottle," may be said to apply to all the powders. The several ingredients before mixing are to be finely powdered.

The following are the preparations into which some of the powders enter :—

Pulvis Amygdalæ Compositus in *Mistura Amygdalæ*.

Pulvis Cinnamomi Compositus in *Pilula Aloes et Ferri*, and *Pilula Cambogiæ Composita*.

Pulvis Ipecacuanhæ Compositus in *Pilula Ipecacuanhæ cum Scilla*.

Pulvis Opii Compositus in *Confectio Opii*.

SPIRITUS (SPIRITS).

Including rectified spirit and proof spirit there are sixteen formulæ for these in the *Pharmacopœia*, viz. :—

Spiritus Ætheris.

- „ **Ætheris Nitrosi.**
- „ **Ammoniæ Aromaticus.**
- „ **Ammoniæ Fœtidus.**
- „ **Armoraciæ Compositus.**
- „ **Cajeputi.**
- „ **Camphoræ.**
- „ **Chloroformi.**
- „ **Juniperi.**
- „ **Lavandulæ.**
- „ **Menthæ Piperitæ.**
- „ **Myristicæ.**
- „ **Rectificatus.** ✓
- „ **Rosmarini.**
- „ **Tenuior.** ✓
- „ **Vini Gallici.** ✓

Spiritus Rectificatus, "rectified spirit," or "spirit of wine" contains 84 per cent. by weight, or 89 by volume of absolute alcohol (C_2H_6O), and is obtained by distillation of fermented saccharine fluids.

Spiritus Tenuior, "Proof Spirit" (*a*) contains 49 per cent. by weight, or 58 by volume of absolute alcohol, and is made by diluting 5 pints of rectified spirit with 3 pints of water.

The specific gravity of *Spiritus Rectificatus* is 0·838 ; that of *Spiritus Tenuior* is 0·920.

The Pharmacopœia directs the following tests for the purity of *Spiritus Rectificatus*. It should remain clear on adding to it distilled water. Four fluid ounces of it with thirty grain-measures of the Volumetric Solution of Nitrate of Silver exposed for twenty-four hours to bright sunlight and then decanted from the black powder which has formed, should undergo no further change when again exposed to light with more of the test. This test indicates that Amylic alcohol (Fousel oil), or aldehyde are not present in excess. Rectified spirit when perfectly pure does not reduce nitrate of silver.

Absolute alcohol and proof spirit may be similarly tested.

Spiritus Vini Gallici, "Spirit of French Wine," "Brandy." Spirit distilled from French wine. It contains about 55 per cent. by measure of alcohol according to Brande, together with some volatile oil and œnanthic ether. When first distilled is nearly white, but afterwards acquires a brownish colour from the cask in which it is kept.

The remaining spirits may be conveniently divided into SIMPLE and COMPLEX, the former including those which are merely solutions in, or mixtures with, rectified spirit.

SIMPLE SPIRITS.

Spiritus Ætheris, commonly called "Hoffman's Anodyne Spirit," is made by mixing 10 oz. of ether with 20 oz. of rectified spirit. Its specific gravity should be 0·809.

Spiritus Chloroformi, intended to represent "Chloric Ether," which, however, is much stronger. It is prepared by

(*a*) When the specific gravity is ·920 it is said to be "proof;" when the specific gravity is lower than this it is termed "above proof;" and when the specific gravity is higher it is termed "under proof."

dissolving 1 oz. of chloroform in 19 oz. of rectified spirit. Its specific gravity should be 0.871. It differs from chloroform in being readily ignited. It yields a green colour with bichromate of potash and sulphuric acid.

Spiritus Camphoræ, “*Tinctura Camphoræ*,” of Dublin and Edinburgh. Made by dissolving 1 oz. of camphor in 9 oz. of rectified spirit. It is decomposed by water, the greater part of the camphor separating.

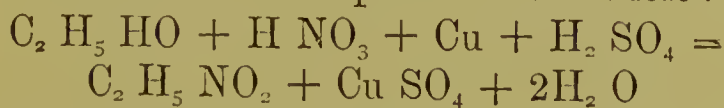
Spiritus Cajeputi, *Spiritus Juniperi*, *Spiritus Lavandulæ*, *Spiritus Menthæ Piperitæ*, *Spiritus Myristicæ*, and *Spiritus Rosmarini* are all made by dissolving 1 oz. of the oil in 49 oz. of rectified spirit. They are all one-fifth the strength of the preparations of the same name in the British Pharmacopœia of 1864.

SPIRITS OF COMPLEX CONSTITUTION.

Spiritus Ætheris Nitrosi, “Sweet Spirit of Nitre.” A spirituous solution containing nitrous ether ($C_2H_5NO_2$).

Preparation.—Add 1 pint of rectified spirit gradually to 2 oz. of sulphuric acid, and then add gradually $2\frac{1}{2}$ oz. of nitric acid. Put the mixture into a retort containing 2 oz. of fine copper wire, and distil between 170° and 180° until 12 oz. have passed over. Withdraw the heat now, and when the contents of the retort have cooled, add $2\frac{1}{2}$ oz. more of nitric acid, and re-distil until the distillate has increased to 15 oz. Mix this with 2 pints of rectified spirit, or as much as will make the product of the same specific gravity and percentage of ether separated by chloride of calcium.

The following is the *rationalé* of the above process, which was proposed by Mr. Redwood. The sulphuric acid decomposes the alcohol, forming ether, and this is converted into nitrous ether by the nitrous acid, which is generated by the action of the copper on the nitric acid. The following equation indicates the decomposition as a whole :—




Nitrous Ether or Nitrite of Ethyl.

The Pharmacopœia gives the following characters and tests :—

“Transparent and nearly colourless, with a very slight tinge of yellow, mobile, inflammable, of a peculiar penetrating apple-like odour, and sweetish, cooling, sharp taste. Specific gravity 0·845. It effervesces feebly or not at all when shaken with a little bicarbonate of soda (*showing the absence of free acid*). When agitated with solution of sulphate of iron and a few drops of sulphuric acid, it becomes deep olive brown or black (*due to the formation of nitric oxide*). If it be agitated with twice its volume of saturated solution of chloride of calcium in a closed tube, 2 per cent. of its original volume will separate in the form of nitrous ether, and rise to the surface of the mixture (*showing that 10 per cent. of nitrous ether is present, 8 per cent. always remaining unseparated*).”

Spiritus Ammonie Aromaticus, “Sal Volatile,” a spirituous solution of ammonia, neutral carbonate of ammonia, and oils of nutmeg and lemon. It is prepared by distilling 7 pints of a mixture of carbonate of ammonia 8 oz., strong solution of ammonia 4 oz., volatile oil of nutmeg 4 drms., oil of lemon 6 drms., rectified spirit 6 pints, and water 3 pints. Its specific gravity is 0·870.

Spiritus Ammonie Fœtidus, a spirituous solution of the volatile oil of assafœtida with solution of ammonia. It is prepared by macerating 1½ oz. of assafœtida in 15 oz. of rectified spirit for 24 hours, distilling off the spirit mixing the product with 2 oz. of strong solution of ammonia, and adding sufficient spirit to make up the bulk to 1 pint.

Spiritus Armoracise Compositus (1 in 8) :

Made by distilling, with a moderate heat, 1 gallon of a mixture of 20 oz. each of scraped fresh horseradish-root and bitter orange-peel, ½ oz. of bruised nutmeg, 1 gallon of proof spirit, and 2 pints of water.

The following are the preparations into the composition of which the spirits enter :—

Spiritus Ætheris in *Tinctura Lobeliae Æthereæ*.

Spiritus Ammoniac Aromaticus in *Tinctura Guaiaci Ammoniata* and *Tinctura Valerianæ Ammoniata*.

Spiritus Juniperi in *Mistura Creasoti*.

Spiritus Myristicæ in *Mistura Ferri Composita*.

Spiritus Vini Gallici in *Mistura Spiritus Vini Gallici*.

Spiritus Rectificatus and *Spiritus Tenuior* in many tinctures.

SUCCI (JUICES).

Of these there are but three, viz. :—

Succus Conii.

„ **Scoparii.**

„ **Taraxici.**

They are directed to be prepared by pressing out the juice from 7 lbs. of the fresh bruised plants, and to every three measures of juice so expressed adding 1 of rectified spirit to preserve it from decomposition; the product is then to be set aside for 7 days, filtered, and kept in a cool place.

Succus Limonis, *Succus Mori*, and *Succus Rhamni* are merely the fresh expressed juices of the ripe fruits. These last three will be more fully considered under the *Materia Medica*.

SUPPOSITORIA (SUPPOSITORIES).

These are solid bodies for introduction into the rectum. There are four of them in the *Pharmacopœia* :—

Suppositorium Acidi Tannici.

„ **Hydrargyri.**

„ **Morphiæ.**

„ **Plumbi Compositum.**

They are made by melting the wax and oil of theobroma by a gentle heat; the active principle and the benzoated lard having been rubbed together in a mortar are then added, and the ingredients thoroughly mixed; the mixture is then poured, while it is fluid, into suitable moulds of the capacity of 15 grains.

The following table gives their composition and strength:

	Each contains—	Active Ingredients.	Benzo- lated Lard.	White Wax.	Oil of Theo- broma.
<i>S. Acid Tannic</i>	3 grs. of Tannic Acid.	Tannic Acid, 36 grs.	grs. 44	grs. 10	grs. 90
<i>S. Hydrargyri</i>	5 grs. of Mercurial Ointment.	Mercurial Ointment 60 grs.	20	20	80
<i>S. Morphiæ ...</i>	$\frac{1}{2}$ gr. of Hydrochlorate of Morphia.	Hydrochlorate of Morphia, 6 grs.	64	20	90
<i>S. Plumbi ...</i>	3 grs. of Acetate of Lead, and 1 gr. of Opium.	Acetate of Lead, 36 grs., Opium, 12 grs.	42	10	80

SYRUPI (SYRUPS).

Aqueous solutions of substances saturated with sugar. The following are the seventeen officinal syrups, with the strength of each :—

Syrupus Aurantii	(<i>Tincture</i>), 1 in 8.
„	Aurantii Floris , 1 in $6\frac{3}{4}$.
„	Ferri Phosphatis , 1 gr. in each drachm.
„	Ferri Iodidi , $4\frac{1}{3}$ grs. in each drachm.
„	Hemidesmi , 1 in 8.
„	Limonis (<i>Juice</i>), 1 in 2.
„	Mori (<i>Juice</i>), 1 in 2.
„	Papaveris (<i>Capsules</i>), 1 in $2\frac{1}{4}$.
„	Rhamni .
„	Rhei (<i>Root</i>), 1 in 14.
„	Rhædos (<i>Petals</i>), 1 in $3\frac{1}{2}$.
„	Rosæ Gallicæ , (<i>Petals</i>), 1 in $17\frac{1}{4}$.
„	Scillæ , 1 in 17.
„	Sennæ , 1 in 2.
„	Tolutanus , 1 in 2.
„	Zingiberis (<i>Strong Tincture</i>), 1 in 26.

The following table gives the ingredients, product, and specific gravity of the syrups :—

	Ingredients.	Product.		Sp. Gr.
		lbs.	ozs.	
<i>Syrupus</i> ...	Refined sugar, 5 lbs. Distilled water, 2 pints.	7½	0	1·330
<i>S. Scillæ</i> ...	Refined sugar, 2½ lbs. Vinegar of squill, 1 pint.			
<i>S. Limonis</i> .	Refined sugar, 2¼ lbs. Fresh lemon peel, 2 oz. Lemon juice, 1 pint.	3½	0	1·34
<i>S. Aurantii</i> <i>Flor</i>	Orange-flower water, 8 oz. Refined sugar, 3 lbs. Distilled water, 16 oz.	4½	0	1·330
<i>S. Tolutanus</i>	Balsam of tolu, 1¼ oz. Refined sugar, 2 lbs. Distilled water, 1 pint.	3	0	1·330
<i>S. Hemidesmi</i>	Hemidesmus root, 4 oz. Refined sugar, 28 oz. Boiling distilled water, 1 pint.	2	10	1·335
<i>S. Rosæ Gal-</i> <i>licæ</i>	Dried red-rose petals, 2 oz. Refined sugar, 30 oz. Boiling distilled water, 1 pint.	2	14	1·335
<i>S. Ferri Io-</i> <i>didi</i>	Fine iron wire, 1 oz. Iodine, 2 oz. Refined sugar, 28 oz. Distilled water, 13 oz.	2	11	1·385
<i>S. Ferri Phos-</i> <i>phatis</i>	Granulated sulphate of iron, 224 grs. Phosphate of soda, 200 grs. Acetate of soda, 74 grs. Dilute phosphoric acid, 5½ oz. Refined sugar, 8 oz. Distilled water, 8 oz.	12	0	
<i>S. Mori</i> ...	Mulberry juice, 1 pint. Refined sugar, 2 lbs. Rectified spirit, 2½ oz.	3	6	1·33
<i>S. Rhamni</i> ...	Buckthorn juice, 4 pints. Ginger, { of each, ¾ oz. Pimento, { Refined sugar, 5 lbs. Rectified spirit, 6 oz.	...		1·32

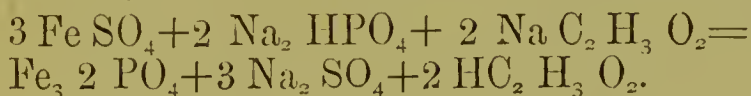
	Ingredients.	Product.	Sp. Gr.
<i>S. Rhœadlos</i>	Fresh red-poppy petals, 13 oz. Refined sugar, $2\frac{1}{2}$ lbs. Distilled water, 1 pint. Rectified spirit, $2\frac{1}{2}$ oz.	lbs. oz. 3 10	1·330
<i>S. Rhei</i> ...	Rhubarb root, } Coriander fruit, } each, 2 oz. Refined sugar, 24 oz. Distilled water, 24 oz. Rectified spirit, 8 oz.		
<i>S. Sennæ</i> ...	Senna, 16 oz. Oil of coriander, 3 min. Refined sugar, 24 oz. Distilled water, 5 pints. Rectified spirits, 2 pints.	2 10	1·310
<i>S. Papaveris</i>	Poppy capsules (dried and freed from seeds), 36 oz. Refined sugar, 4 lbs. Boiling distilled water, q. s. Rectified spirit, 16 oz.	$6\frac{1}{2}$ 0	1·320
<i>S. Aurantii</i> .	Tincture of orange peel, 1 oz. Syrup, 7 oz.		
<i>S. Zingiberis</i>	Strong tincture of ginger, 6 drms. Syrup, 17 oz.		

For the directions for the preparation of the Syrups reference must be made to the Pharmacopœia. We have not here given the processes, for the details are, in the majority of instances, complicated, and we do not think that a student under examination should be required to know these, except, indeed, the *modus operandi* in the case of *Syrupus Ferri Iodidi* and *Syrupus Ferri Phosphatis*; to these we direct the special attention of the student.

In the preparation of *Syrupus Ferri Iodidi* the iron, iodine, and 3 ozs. of the water are to be shaken well together until the froth of the mixture becomes white; a syrup having been made with the sugar and 10 ozs. of the water, the solution of iodide of iron is to be filtered into it while it is still hot.

Syrupus Ferri Phosphatis is a solution of freshly precipitated phosphate of iron in dilute phosphoric acid, converted into a syrup by the addition of sugar, which prevents the peroxidation of the iron.

The following reaction occurs in its preparation :—



Syrups are best kept in full bottles, otherwise the sugar is apt to crystallise from concentration of the syrup. Syrups containing too little sugar are apt to undergo vinous fermentation. This condition may be known by the formation of froth on the surface, a vinous odour, and diminished consistence. The froth is due to the disengagement of carbonic acid gas; the odour is due to the presence of alcohol, and the diminished consistence to the loss of the sugar. According to Macculloch, the presence of chlorate of potash will prevent fermentation in syrups.

Syrupus Papaveris made by the present process is not so liable to ferment as formerly, rectified spirit being now employed to remove the matter which caused fermentation. *Syrupus Sennæ* is also no longer liable to ferment.

Syrupus Limonis when kept too long is apt to deposit grape-sugar.

In *Syrupus Ferri Iodidi* the sugar does *not* effectually prevent decomposition. The best means of preserving the iodide of iron in its integrity is that proposed by Mr. Squire, viz., suspending a coil of iron-wire in the bottle containing it.

Syrupus Ferri Phosphatis becomes brown when long kept, and this has been attributed to the production of peracetate of iron from the presence of a small quantity of acetic acid; it is, however, more probably due to the action of phosphoric acid on the sugar.

Syrupus enters into the composition of *Mistura Cretæ*, *Mistura Creosoti*, *Pilula Cambogiæ Composita*, *Syrupus Aurantii*, and *Syrupus Zingiberis*.

Syrupus Aurantii is an ingredient of *Confectio Sulphuris*.

TINCTURA (TINCTURES).

These are spirituous solutions of substances, the active principles of which are imperfectly soluble in water, or whose aqueous solutions are not stable. There are no less than sixty-five tinctures, these are named and classified according to their strength in the following table :—

1 in 2.	
Tinctura Zingiberis Fortior.	
1 in 4.	
Tinctura Ergotæ.	
„ Ferri Perchloridi. (<i>Liquor.</i>)	
1 in 8.	
Tinctura Aconiti.	Tinctura Lobeliæ.
„ Assafœtidæ.	„ Lobeliæ Ætherea.
„ Buchu.	„ Lupuli.
„ Calumbæ.	„ Myrrhæ.
„ Cascarillæ.	„ Sabinæ.
„ Catechu.	„ Scillæ.
„ Cocci.	„ Senegæ.
„ Colchici Seminum	„ Sennæ.
„ Conii.	„ Serpentariæ.
„ Cubebæ.	„ Stramonii.
„ Digitalis.	„ Sumbuli.
„ Gallæ.	„ Tolutani.
„ Hyoscyami.	„ Valerianæ.
„ Jalapæ.	„ Valerianæ Ammo-
„ Krameriæ.	niata.
„ Limonis.	„ Zingiberis.
1 in 5.	
Tinctura Cinchonæ Flavæ.	
„ Guaici Ammoniata.	
„ Pyrethri.	
„ Veratri Viridis,	
1 in 10.	
Tinctura Aurantii.	
„ Benzoini Composita.	
„ Chloroformi Composita.	
„ Cinchonæ Composita.	
„ Kino.	
„ Nucis Vomicae.	
„ Rhei.	

1 in 20.

Tinctura Arnicæ.„ **Belladonnæ.**„ **Cannabis Indicæ** (*Extract.*)„ **Castorei.**„ **Croci.**

1 in 40.

Tinctura Aloes.„ **Iodi.**

1 in 60.

Tinctura Quiniæ.

1 in 80.

Tinctura Cantharidis.„ **Cardamomi Composita.**1 in $13\frac{1}{3}$.**Tinctura Gentianæ Composita.**„ **Opii.**

1 in 27.

Tinctura Capsici.„ **Castorei.**„ **Quassiæ.**

1 in 96.

Tinctura Opii Ammoniata.

1 in 213.

Tinctura Lavandulæ Compositæ.

Tinctura Camphoræ Composita has 1 of opium, 1 of benzoic acid, and $\frac{3}{4}$ of camphor in 240.

Rectified Spirit is used in preparing tinctures of those substances which contain much resin or volatile oil, as in *Tinctura Aconiti*, *Arnicæ*, *Assofetidæ*, *Benzoini Composita*, *Cannabis Indicæ*, *Capsici*, *Castorei*, *Chloroformi Composita*, *Cubebæ*, *Ferri Acetatis*, *Ferri Perchloridi*, *Iodi*, *Kino*, *Lavandulæ Composita*, *Myrrhæ*, *Nucis Vomiceæ*, *Opii Ammoniata*, *Pyrethri*, *Tolutana*, *Veratri Viridis*, *Zingiberis Fortior*.

Proof Spirit is used in the preparation of all the remaining tinctures, except two so-called "*Ammoniated Tinctures*"—viz., *Tinctura Opii Ammoniata* and *Tinctura Valerianæ Ammoniata*, in which Aromatic Spirit of

Ammonia is employed ; one "*Ethereal Tincture*," *Tinctura Lobelie Ætherea*, in which Spirit of Ether is used ; and one in which Tincture of Orange is used—viz., *Tinctura Quiniae*.

Proof spirit is adapted to make tinctures of such substances as are partly soluble in water and partly in spirit.

The following are the processes according to one or other of which, with the exception of *Tinctura Ferri Acetatis*, all the tinctures are made :—

1st. SIMPLE SOLUTION OR MIXTURE.—*Tinctura Cannabis Indicæ*, *Chloroformi Composita*, *Ferri Perchloridi*, *Iodi*.

2nd. MACERATION.—Macerate the drug in all, or 15 ounces of, the spirit for seven days in a closed vessel, occasionally agitating, filter (in many cases press and strain), and add sufficient spirit to make 1 pint. *Tinctura Aloes*, *Assafoetidæ*, *Aurantii*, *Benzionis Composita*, *Camphoræ Composita*, *Cantharidis*, *Castorei*, *Catechu*, *Cocci*, *Guaiaci Ammoniata*, *Kino*, *Limonis*, *Lobelie Ætherea*, *Opii*, *Opii Ammoniata*, *Quassiae*, *Tolutana*, *Valerianæ Ammoniata*.

The preparation of *Tinctura Lavandulæ Composita* is somewhat exceptional ; after macerating the solid ingredients in the spirit, straining and pressing as above, dissolve the oils in the strained tincture, filter and add sufficient spirit to make up to 2 pints. In *Tinctura Tolutana* the balsam of tolu is to be macerated in 15 ounces of the spirit for six hours only, or until the balsam is dissolved. In *Tinctura Quiniae* the sulphate of quinia is to be dissolved in the tincture of orange-peel by aid of a gentle heat. The solution is to remain for three days in a closed vessel, occasionally agitating it, and is finally filtered.

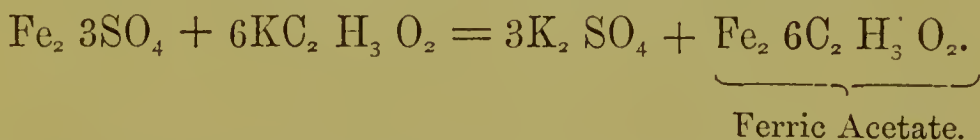
3rd. PERCOLATION.—Pack in a percolator, pour on half-a-pint of the spirit, two hours after add more spirit, and percolate slowly until 1 pint is collected. *Tinctura Zingiberis Fortior*.

4th. MACERATION AND PERCOLATION.—Macerate the drug for 48 hours in 15 ounces of the spirit in a closed

vessel, occasionally agitating ; transfer to a percolator, and when the fluid no longer passes, continue the percolation with 5 ounces more of the spirit. Then press the contents of the percolator, filter the products, mix the liquids, and lastly, add sufficient spirit to make 1 pint. All the remaining 38 tinctures are made according to this process. It should be mentioned that in *Tinctura Nucis Vomice* the drug before being subjected to the above treatment is directed to be steamed until it is well softened, then rapidly dried and reduced to a fine powder.

The preparation of *Tinctura Ferri Acetatis* differs from all the foregoing ; 2 ounces of acetate of potash is dissolved in 10 ounces of rectified spirit, and $2\frac{1}{2}$ ounces of solution of persulphate of iron is mixed with 8 ounces of rectified spirit ; the solutions are then mixed in a bottle and shaken occasionally during an hour ; the mixture is then filtered, and when the liquid has ceased to pass, as much rectified spirit is put on the filter as will make the filtered product measure 1 pint.

The following equation expresses the reaction :—



In the preparation of most tinctures the drugs are directed to be cut small or bruised, or coarsely powdered, &c.

All the tinctures are simple except those enumerated in the following table, and *Tinctura Aloes*, which has $1\frac{1}{2}$ ounces of extract of liquorice added, the object of which is to hide the taste and to suspend the aloes in the spirit ; *Tinctura Catechu*, in the preparation of which 1 ounce of cinnamon bark is used ; and *Tinctura Iodi*, which contains $\frac{1}{4}$ ounce of iodide of potassium, the use of which is to aid in the solution of the iodine.

Tinctura Opii Ammoniata, *Tinctura Rhei*, and *Tinctura Sennae* are compound in every sense, and as such are included in the following table :—

TABLE OF INGREDIENTS OF COMPOUND TINCTURES.

Tinctura Opii Ammoniacata.

Opium ...	...	...	...	...	...	100 grs.
Saffron ...	} each	...	...	...	...	180 grs.
Benzoic Acid		...	...	...	...	1 drm.
Oil of Anise ...	...	...	...	...	...	4 oz.
Strong solution of Ammonia	...	...	...	...	...	16 oz.
Rectified Spirit	...	...	...	...	...	

Contains 1 gr. of opium in 96 mins.

Tinctura Rhei.

Rhubarb ...	...	...	...	...	...	2 oz.
Cardamom Seeds (freed from pericarps)	} each	...	...	...	...	1 oz.
Coriander Fruit		...	...	...	...	1 pint.
Saffron ...		...	...	...	...	
Proof Spirit	...	...	...	...	...	

Tinctura Sennæ.

Senna ...	...	...	...	...	...	2½ oz.
Raisins ...	...	...	...	...	...	2 oz.
Carraway Fruit	} each	...	...	...	...	½ oz.
Coriander Fruit		...	...	...	...	1 pint.
Proof Spirit	...	...	...	...	...	

Tinctura Benzoini Composita.

Benzoin ...	...	...	...	...	...	2 oz.
Prepared Storax	...	...	...	...	...	1½ oz.
Balsam of Tolu	...	...	...	...	...	½ oz.
Socotrine Aloes	...	...	...	...	...	160 grs.
Rectified Spirit	...	...	...	...	...	1 pint.

Tinctura Camphoræ Composita.

Opium	} each	...	...	...	...	40 grs.
Benzoic Acid		...	...	...	...	30 grs.
Camphor ...	...	...	...	...	...	½ drm.
Oil of Anise ...	...	...	...	...	...	1 pint.
Proof Spirit	...	...	...	...	...	

One gr. of opium is contained in ½ oz.

Tinctura Cardamomi Composita.

Cardamom Seeds (freed from pericarps)	...	...	...	...	...	¼ oz.
Carraway Fruit	...	...	...	...	...	¼ oz.
Raisins...	...	...	...	...	...	2 oz.
Cinnamon Bark	...	...	...	...	...	½ oz.
Cochineal	...	...	...	...	...	60 grs.
Proof Spirit	...	...	...	...	...	1 pint.

Tinctura Cinchonæ Composita.

Pale Cinchona Bark...	...	...	...	...	...	2 oz.
Bitter Orange Peel	...	...	...	...	...	1 oz.
Serpentary Root	...	...	...	...	...	½ oz.
Saffron ...	...	...	...	...	...	60 grs.
Cochineal	...	...	...	...	...	30 grs.
Proof Spirit	...	...	...	...	...	1 pint.

Tinctura Chloroformi Composita.

Chloroform	...	...	...	...	...	2 oz.
Compound Tincture of Cardamoms	...	...	...	...	...	10 oz.
Rectified Spirit	...	...	...	...	...	8 oz.

Tinctura Gentianæ Composita.

Gentian Root	...	...	...	...	...	1½ oz.
Bitter Orange Peel	...	...	...	...	...	¾ oz.
Cardamom Seeds (freed from pericarps)	...	...	...	...	...	¼ oz.
Proof Spirit	...	...	...	...	...	1 pint.

Tinctura Lavandulæ Composita.

Oil of Lavender	...	...	...	...	...	1½ drms.
Oil of Rosemary	...	...	...	...	...	10 mins.
Cinnamon Bark	}	each	...	...	...	150 grs.
Nutmeg						
Red Sandal-wood	...	...	...	...	...	300 grs.
Rectified Spirit	...	...	...	...	...	2 pints.

Several tinctures become milky when added to aqueous fluids, owing to the precipitation of resinous or oily matters, as *Tinctura Assafœtida*, *Benzoini Composita*, *Cannabis Indica*, *Guaiaci Ammoniata*, *Jalapæ*, and *Tolutana*. If mucilage of gum acacia be rubbed up with the tincture before adding water the insoluble matters will be suspended.

A few of the tinctures spoil by keeping, thus, *Tinctura Kino* and *Tinctura Catechu* gelatinise when kept for a long time; *Tinctura Ferri Acetatis* also gelatinises on keeping, owing to the separation of the insoluble basic acetate, and *Tinctura Gallæ* when long kept becomes useless as a test for gelatine and the vegetable alkaloids, owing to the change of its tannic acid into gallic acid.

Tinctura Colchici made from the seeds is less liable to purge or nauseate than if made from the corm.

Tinctura Assafœtida is used only in the form of enema. *Tinctura Digitalis*, if well made, has a greenish colour by transmitted light. *Tinctura Conii* is known to be good if the odour of conia is evolved on adding to it solution of potash.

Several of the tinctures have received popular names, thus, *Tinctura Aconiti* is sometimes called "Fleming's Tincture;" it must be remembered, however, that Fleming's tincture is much stronger than the Pharmacopœial one. *Tinctura Benzoini Composita* is termed "Friar's Balsam;" *Tinctura Camphoræ Composita* is known as "Paregoric

Elixir ;" while *Tinctura Opii Ammoniata* is sometimes called "Scotch Paregoric." *Tinctura Cinchonæ Composita* is occasionally sold as "Huxham's Tincture of Bark ;" it contains only half as much pale bark as the *Tinctura Cinchonæ Flavæ* does of yellow bark. Lastly, *Tinctura Opii* is known as "Laudanum."

The following are the preparations into the composition of which the tinctures enter :—

Tinctura Aurantii in *Mistura Ferri Aromatica*, *Syrupus Aurantii*, and *Tinctura Quinæ*.

Tinctura Cardamomi Composita in *Decoctum Aloes Compositum*, *Mistura Ferri Aromatica*, *Mistura Sennæ Composita*, and *Tinctura Chloroformi Composita*.

Tinctura Iodi in *Vapor Iodi*.

Tinctura Lavandulæ Composita in *Liquor Arsenicalis*.

Tinctura Opii in *Enema* and *Linimentum Opii*.

Tinctura Sennæ in *Mistura Sennæ Composita*.

Tinctura Tolutana in *Trochisci Acidi Tannici*, *Trochisci Morphæ*, *Trochisci Morphæ et Ipecacuanhæ*, and *Trochisci Opii*.

Tinctura Zingiberis Fortior in *Syrupus Zingiberis*.

TROCHISCI (LOZENGES).

This form of administration is adapted to such medicines as may be given in small doses, and which have not a disagreeable flavour.

There are ten formulæ for them, viz. :—

Trochisci Acidi Tannici:

- " Bismuth.
- " Catechu.
- " Ferri Redacti.
- " Ipecacuanhæ.
- " Morphæ.
- " Morphæ et Ipecacuanhæ.
- " Opii.
- " Potassæ Chloratis.
- " Sodæ Bicarbonatis.

The following table gives the composition and strength of each :—

	Each contains	Active Ingredient.	Extra.	Refined Sugar.	Gum Acacia.	Mucilage of Gum Acacia.	Distilled Water.
<i>T. Catechu</i>	1 gr. of Catechu	Pale Catechu, 720 grs.		oz. 25	oz. 1	oz. 2	q. s.
<i>T. Ferri Redacti</i>	1 gr. of Reduced Iron	Reduced Iron, 720 grs.		25	1	2	q. s.
<i>T. Ipecacuanha</i>	$\frac{1}{4}$ gr. of Ipecacuanha	Ipecacuanha, 180 grs.		25	1	2	q. s.
<i>T. Potassæ Chloratis</i>	5 grs. of Chlorate of Potash	Chlorate of Potash, 3,600 grs.		25	1	2	q. s.
<i>T. Sodæ Bicarbonatis</i>	5 grs. of Bicarbonate of Soda	Bicarbonate of Soda, 3,600 grs.		25	1	2	q. s.
<i>T. Acidi Tannici</i>	$\frac{1}{2}$ gr. of Tannic Acid	Tannic Acid, 360 grs.	Tinct. of Tolu, $\frac{1}{2}$ oz.	25	1	2	1 oz.
<i>T. Morphicæ</i>	1-36th gr. of Hydrochlorate of Morphia	Hydrochlorate of Morphia, 20 grs.	Tinct. of Tolu, $\frac{1}{3}$ oz.	24	1	2	$\frac{1}{2}$ oz.
<i>T. Morphicæ et Ipecacuanhæ</i>	1-36th gr. of Hydrochlorate of Morphia, and 1-12th gr. of Ipecacuanha	Hydrochlorate of Morphia, 20 grs., Ipecacuanha, 60 grs.	Tinct. of Tolu, $\frac{1}{2}$ oz.	24	1	2	$\frac{1}{2}$ oz.
<i>T. Opii</i>	1-10th gr. of Extract of Opium	Extract of Opium, 72 grs.	Tinct. of Tolu, $\frac{1}{2}$ oz., Extract Liquorice, 6 oz.	16	2		q. s.
<i>T. Bismuthi</i>	2 grs. of Subnitrate of Bismuth	Subnitrate of Bismuth, 1,440 grs.	Carbonate of Magnesia, 4 oz., Precip. Carb. of Lime, 6 oz., Rose water, q. s.	29	1	2	

It will be noticed that the first five of these lozenges have no extra ingredients, and, moreover, that the proportion of refined sugar, gum acacia, mucilage, and water, is the same in each case. It will also be presently shown that the directions for the preparation of each of these lozenges are the same. The next four lozenges in the table have half-an-ounce of tincture of tolu as an additional ingredient. Extract of liquorice is used in *Trochisci Opii*, in lieu of the mucilage, and rose water is substituted for distilled water in *Trochisci Bismuthi*.

The following direction for preparation applies to all the lozenges, except *Trochisci Acidi Tannici*, *Morphice*, *Morphice Ipecacuanhæ*, and *Opii*.—

“Mix the dry ingredients, and add the mucilage and water to form a proper mass. Divide into 720 lozenges, and dry them in a hot-air chamber with a moderate heat.”

In the preparation of *Trochisci Acidi Tannici* and *Trochisci Morphice*, the active ingredient is first dissolved in the water, the tincture of tolu and mucilage mixed are then added, and, finally, the gum and sugar also previously mixed. In *Trochisci Morphice et Ipecacuanhæ* the same process is performed, but the ipecacuanha is to be mixed with the gum and sugar. In *Trochisci Opii* the extract of opium is to be moistened with a little water, and added with the tincture of tolu, to the extract of liquorice heated in a water-bath; when a proper consistence is obtained, the mixture is to be incorporated on a slab with the sugar and gum previously mixed.

UNGUENTA (OINTMENTS).

These may be generally defined as fatty substances adapted to inunction. In the older Pharmacopœias the so-called “cerates” formed a distinct class; inasmuch as they differ from ointments merely in containing wax (*cera*), and, consequently, in having a firmer consistence they are now very properly grouped with the latter preparations.

Many ointments become rancid on keeping—an effect at least retarded by the presence of benzoin. Geisler states that the addition of a few drops of nitric ether will remove the disagreeable fatty odour of ointments.

The great majority of the ointments are prepared by simple trituration of the ingredients, so as to ensure thorough mixture, but when wax, resins, or concrete oils are to be mixed, the aid of gentle heat is necessary. In general terms the following may be said to be the process. The wax or resins and unctuous matters are to be melted by a gentle heat, they are then to be removed from the fire, and while cooling to be well and constantly stirred, any dry substances to be added being meanwhile incorporated in a state of fine powder. Stress must be laid on the direction to employ *gentle heat*; too strong a temperature would cause the formation of acrid acids.

There are thirty-four formulæ for ointments in the present Pharmacopœia. The following classification, based on the nature of unctuous ingredient, will be found to simplify the study of them.

CLASS I.

Ointments—the basis of which is Prepared Lard.

These are tabulated as follows :—

Ointment.	Strength.	Ingredients.	Basis.
<i>U. Aconitiæ</i> ...	1 in 60	Aconitiæ, 8 grs. Rectified Spirit, $\frac{1}{2}$ drm.	Prepared Lard, 1 oz.
<i>U. Atropiæ</i> ...	1 in 60	Atropiæ, 8 grs. Rectified Spirit, $\frac{1}{2}$ drm.	
<i>U. Iodii</i> ...	1 in 31	Iodine, 16 grs. Iodide of Potassium, 16 grs. Proof Spirit, $\frac{1}{2}$ drm.	
<i>U. Sulphuris Iodidi</i>	1 in 17	Iodide of Sulph. 30 grs.	
<i>U. Potassæ Sulphuratæ</i>	1 in $15\frac{1}{2}$	Sulphurated Potash, 30 grs.	
<i>U. Potassii Iodidi</i>	1 in $8\frac{3}{4}$ (nearly)	Iodide of Potassium, 64 grs. Carbonate of Potash, 4 grs. Distilled Water, 1 drm.	
<i>U. Belladonnæ</i>	1 (of ex.) in $6\frac{1}{2}$	Ext. of Bellad., 80 grs.	
<i>U. Hydrargyri Subchloridi</i>	1 in $6\frac{1}{2}$	Subchloride of Mercury, 80 grs.	

These are prepared by thoroughly mixing the ingredients by trituration. In the preparation of the first three the solid ingredients, before being incorporated with the lard, are to be well rubbed up with the spirit. In the preparation of *Unguentum Potassii Iodidi* the solid ingredients are to be dissolved in the water before being added to the lard ; and in *Unguentum Belladonnæ* also the extract is directed to be first rubbed smooth with a few drops of water.

The use of the iodide of potassium and spirit in making the *Unguentum Iodidi* is merely to aid in the incorporation of the iodine with the basis.

Unguentum Potassii Iodidi would become yellow-coloured on keeping (owing to the liberation of iodine), if free alkali were not present. It is to prevent this that carbonate of potash is employed.

In applying ointments of powerful alkaloids, as of aconite, the precaution should always be taken of ascertaining that the skin is not abraded.

CLASS II.

Ointments—the basis of which is Benzoated Lard.

Ointment.	Strength.	Ingredients.	Basis.
<i>U. Plumbi Acetatis.</i>	1 in 37½	Acetate of Lead, 12 grs.	Benzoated Lard, 1 oz.
<i>U. Gallæ ...</i>	1 in 6½	Galls, 80 grs.	
<i>U. Gallæ cum Opio.</i>	1 (of galls) in 6½, and 1 of opium in 15	Galls, 80 grs. Opium, 32 grs.	
<i>U. Zinci ...</i>	1 in 6½	Oxide of Zinc, 80 grs.	
<i>U. Sulphuris...</i>	1 in 5	Sublimed Sulphur, ¼ oz.	

With the single exception of *Unguentum Zinci* the simple direction for the preparation of the foregoing ointments is

to “mix thoroughly.” In the preparation of *Unguentum Zinci* the lard is to be melted before adding to it the oxide of zinc, and the mixture to be stirred while cooling.

CLASS III.

Ointment—the basis of which is Prepared Lard, and which also contains Prepared Suet.

Ointment.	Strength.	Ingredients.	Basis, &c.
<i>U. Hydrargyri</i>	1 in 2	Mercury, 1 lb.	Prep. Lard, 1 lb. Prep. Suet, 1 oz.

The ointment is prepared by rubbing the ingredients together until metallic globules cease to be visible. The extinction of the mercury is extremely difficult, and is now accomplished by machinery. If a portion of the ointment rubbed on paper shows metallic globules under a magnifier of four powers, it may be concluded that the mercury has not been sufficiently extinguished.

Whether mercury exists in this ointment merely in a state of mechanical division, or in a state of oxidation, is a debated point. The ointment, when first made, is bluish, hence its common name “Blue Ointment ;” but, on keeping, the colour becomes darker—a change attributable to oxidation ; it is very generally believed that the oxide so formed enters into chemical combination with the lard, or one of its fatty acids ; indeed some pharmacutists contend that the efficacy of the ointment depends upon the formation of this compound.

The use of the suet in *Unguentum Hydrargyri* is to prevent the separation of the metal in warm weather.

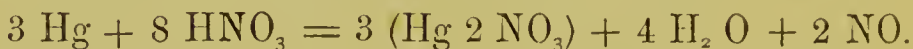
CLASS IV.

Ointments—the basis of which is Prepared Lard, and which also contain Olive Oil.

Ointment.	Strength.	Active Ingredients.	Basis, &c.
<i>U. Hydrargyri Nitratis.</i>	1 in 15½	Mercury, 4 oz. Nitric Acid, 12 oz.	Prep. Lard, 15 oz. Olive Oil, 32 oz.
<i>U. Veratriæ ...</i>	1 in 60	Veratria, 8 grs.	Prep. Lard, 1 oz. Olive Oil, 1 drn.

The first of these (commonly known as “ Citrine Ointment ”), is made as follows :—Dissolve the mercury in the nitric acid by a gentle heat ; melt the lard in the oil by a water-bath in a large porcelain vessel ; mix the two mixtures while hot, and if the mixture does not froth up, heat it until it does ; finally stir while cooling.

By the action of the nitric acid on the mercury, pernitrate of mercury is produced, thus :—



When the mercurial solution is mixed with the lard and oil, a reaction also occurs, the nature of which is complicated, and has not been hitherto satisfactorily explained.

Unquentum Veratriæ is made by rubbing the oil and the veratria together, and then mixing with the lard.

CLASS V.

Ointments—the basis of which is Prepared Lard, and which also contain Yellow Wax.

Ointment.	Strength.	Active Ingredients.	Basis, &c.
<i>U. Sabinæ</i> ...	1 in $3\frac{3}{8}$ (nearly)	Fresh Savin Tops, 8 oz.	Prep. Lard, 16 oz. Yellow Wax, 3 oz.
<i>U. Terebinthineæ</i>	1 (oil) in $2\frac{1}{8}$	Oil of Turp., 1 oz. Resin, 60 grs.	Prep. Lard, $\frac{1}{2}$ oz. Yellow Wax, $\frac{1}{2}$ oz.

The first is made by melting the lard and wax together by a water-bath, adding the Savin, and digesting for 20 minutes, finally straining through calico.

Unquentum Terebinthineæ is simply made by melting the ingredients by a water-bath, and stirring the mixture while cooling.

CLASS VI.

Ointments—the basis of which is Simple Ointment.

Unquentum Simplicis is made by melting together by a water-bath, and stirring while cooling.—Prepared lard, 3 ozs. ; white wax, 2 ozs. ; almond oil, 3 ozs.

Ointment.	Strength.	Active Ingredients.	Basis.
<i>U. Hydrargyri Iodidi Rubri.</i>	1 in 28	Red Iodide of Mercury, 16 grs.	Simple Ointment, 1 oz.
<i>U. Creasoti ...</i>	1 in 9	Creasote, 1 drm.	
<i>U. Cadmii Iodidi.</i>	1 in 8	Iodide of Cadmium, 62 grs.	
<i>U. Hydrargyri Ammoniata.</i>	1 in 8	Ammoniated Mercury, 62 grs.	
<i>U. Plumbi Carbonatis.</i>	1 in 8	Carbonate of Lead, 62 grs,	
<i>U. Plumbi Iodidi.</i>	1 in 8	Iodide of Lead, 62 grs.	
<i>U. Antimoni Tartaratis.</i>	1 in 5	Tartarated Antimony, $\frac{1}{4}$ oz.	
<i>Elemi... ...</i>	1 in 5	Elemi, $\frac{1}{4}$ oz.	

With the single exception of *Unguentum Elemi* the simply direction for the preparation of the ointments of this class is to mix the ingredients thoroughly.

Unguentum Elemi is directed to be prepared by melting the ingredients, straining through flannel, and stirring constantly while the ointment congeals.

Unguentum Plumbi Carbonatis was the old “*Unguentum Cerussæ*.” *Unguentum Hydrargyri Ammoniati* is commonly known as “White Precipitate Ointment.”

CLASS VII.

Ointments—the basis of which is made up of Wax and Oil.

Ointment.	Strength.	Ingredients.	Wax.	Oil.
<i>U. Cantharidis</i>	1 in 8	Cantharides, 1 oz. ...	Yellow, 1 oz.	Olive, 6 oz.
<i>U. Hydrargyri Compositum.</i>	1 in $4\frac{1}{2}$	Oint. of Mercury, 6 oz. Camphor, $1\frac{1}{2}$ oz.	Yellow, 3 oz.	Olive, 3 oz.
<i>U. Hydrargyri Oxidi Rubri.</i>	1 in 8	Red Oxide of Mercury, 62 grs.	Yellow, $\frac{1}{4}$ oz.	Almond, $\frac{3}{4}$ oz.
<i>U. Cetacci ...</i>	1 in 5	Spermaceti, 5 oz. ...	White, 2 oz.	Almond, 1 pint.
<i>U. Plumbi Subacetatis Compositum.</i>	1 in $5\frac{1}{2}$	Solution of Subacetate of Lead, 6 ozs. Camphor, 60 grs.	White, 8 oz.	Almond, 1 pint.

Unguentum Cantharidis is made by infusing the cantharides in the oil in a covered vessel for twelve hours, placing the vessel in boiling water for fifteen minutes, straining through muslin with strong pressure, adding the product to the wax previously melted, and stirring constantly while the mixture cools. Olive oil being a good solvent of the active principle of cantharides is now substituted for the boiling water of the older Pharmacopœias.

Unguentum Hydrargyri Compositum and *Unguentum Hydrargyri Oxidi Rubri* are both made by melting the wax with a gentle heat, mixing the oil with it, and when the mixture is nearly cold adding the other ingredients and mixing thoroughly.

Unguentum Cetacei is simply prepared by melting the ingredients by a gentle heat, and stirring while cooling.

The following are the directions for the preparation of *Unguentum Plumbi Subacetatis Compositum*:—Melt the wax with 16 ozs. of the oil by heat of water bath, remove the vessel, and when the mixture begins to thicken, add gradually the solution of subacetate of lead, stirring the mixture while it cools; finally, add the camphor dissolved in the rest of the oil, and mix thoroughly.

Unguentum Hydrargyri Compositum is a substitute for “Scott’s Ointment.” *Unguentum Hydrargyri Oxidi Rubri* is commonly known as “Red Precipitate Ointment.” This ointment loses its red colour on keeping, owing to the conversion of red to black oxide, or reduction to the metallic state.

Unguentum Plumbi Subacetatis Compositum is a modification of “Goulard’s Cerate.”

UNCLASSED.

Unguentum Picis Liquida.—Tar, 5 ozs.; yellow wax, 2 ozs. Melt the wax with a gentle heat; add the tar, and stir while cooling.

VAPORES (INHALATIONS).

THERE are five of these preparations now officinal. They should be so administered in a suitable apparatus as to enable the patient to breathe without effort the volatile ingredients evolved. They are as follows:—

Vapor Acidi Hydrocyani.—10 to 15 mins. of acid to 1 drm. of cold water.

Vapor Chlori.—2 ozs. of chlorinated lime, and a sufficiency of water to moisten.

Vapor Conice.—60 grs. of extract of hemlock, 1 drm. of solution of potash, and 10 drms. of distilled water. 20 mins. of the mixture are to be put on a sponge, and the vapour of hot water passing over it to be inhaled.

Vapor Creusoti.—12 mins. of creasote and 8 ozs. of boiling water. Cause air to be passed through the mixture, and inhale it.

Vapor Iodi.—1 drm. of tincture of iodine and 1 oz. of water. Apply a gentle heat and inhale the vapour.

The addition of the alkali in *Vapor Conice* at once develops the characteristic odour of the hemlock.

VINA (WINES).

Wine, in consequence of the alcohol contained, and in some instances owing to the acidity, is a solvent of many substances insoluble in water. Wines, however, are sometimes objectionable, both from their liability to undergo decomposition, and owing to the fact that the proportion of alcohol present is by no means always constant.

Including *Vinum Aurantii* and *Vinum Xericum* there are eleven medicinal wines in the present Pharmacopœia, viz. :—

Vinum Aurantii, Orange Wine.

„ **Xericum**, Sherry.

„ **Ferri**.

„ **Colchici**, 1 in 5.

„ **Rhei**, 1 in 15½, or 33 grs. to 1 oz.

„ **Ipecacuanhæ**, 1 in 20, or 22 grs. to 1 oz.

„ **Opii** (*Extract*), 1 in 20.

„ **Aloes**, 1 in 26½.

„ **Ferri Citratis**, 1 in 60, or 8 grs. to 1 oz.

„ **Antimoniale**, 1 in 240, or 2 grs. to 1 oz.

„ **Quiniæ**, 1 in 480, or 1 gr. to 1 oz.

Orange wine forms the basis of *Vinum Ferri Citratis* and *Vinum Quiniæ*; sherry, that of all the other wines.

The following are the ingredients of the wines :—

Vinum Aloes.

Socotrine Aloes	...	...	...	...	1½ oz.
Cardamon Seeds	...	...	...	...	80 grs.
Ginger, <i>coarsely powdered</i>	...	...	...	...	80 grs.
Sherry	...	...	...	...	2 pints.

Vinum Antimoniale.

Tartarated Antimony	...	...	...	...	40 grs.
Sherry	...	...	...	...	1 pint.

Vinum Colchici.

Colchicum corn., <i>sliced, dried, and bruised</i>	...	...	...	...	4 ozs.
Sherry	...	...	...	...	1 pint.

Vinum Ferri.

Fine Iron Wire	...	...	...	...	1 oz.
Sherry	...	...	...	...	1 pint.

Vinum Ferri Citratis.

Citrate of Iron and Ammonia	...	...	...	...	160 grs.
Orange Wine	...	...	...	...	1 pint.

Vinum Ipecacuanhæ.

Ipecacuanha, <i>bruised</i>	...	...	...	...	1 oz.
Sherry	...	...	...	...	1 pint.

Vinum Opii.

Extract of Opium...	...	...	...	...	1 oz.
Cinnamon Bark, <i>bruised</i>	...	...	...	...	75 grs.
Cloves, <i>bruised</i>	...	...	...	...	75 grs.
Sherry	...	...	...	...	1 pint.

Vinum Quiniae.

Sulphate of Quinia	...	...	...	...	20 grs.
Citric Acid	...	...	...	...	30 grs.
Orange Wine	...	...	...	...	1 pint.

Vinum Rhei.

Rhubarb Root, <i>coarse powder</i>	...	...	...	...	1½ ozs.
Canella Alba Bark, <i>coarse powder</i>	...	...	...	...	60 grs.
Sherry	...	...	...	...	1 pint.

It will be seen on reference to the above that all the wines may be said to be simple except *Vinum Aloes*, *Vinum Opii*, and *Vinum Rhei*.

All the wines are made by maceration (pressing and straining when necessary) and subsequent filtration, except *Vinum Antimoniale*, *Vinum Ferri Citratis*, and *Vinum Quiniae*, and these are made by simple solution and subsequent filtration.

Vinum Xericum contains from 17 to 18 per cent. of alcohol, with colouring matter, œnanthic ether, bitartrate of potash, malates and sugar, &c.

Vinum Aurantii is made by fermenting a saccharine solution to which the fresh peel of bitter orange has been added. It contains about 12 per cent. of alcohol, and is slightly acid.

In *Vinum Antimoniale*, when the tartarated antimony is impure, or the wine of inferior quality, perfect solution is often impossible, and the salt is frequently decomposed; the wine often contains matters which cause precipitation of the *oxide* of antimony.

Vinum Ferri very probably contains *tartrate of potash and iron*, formed by the action on the iron of the bitartrate of potash contained in the sherry.

Vinum Ipecacuanhæ when long kept not unfrequently throws down a precipitate of a mixture of bitartrate of potash and cephaelate of emetina.

Vinum Quiniae is a solution of neutral sulphate and citrate of quinine in orange wine; the citric acid aids materially in the solution of the disulphate.

UNCLASSED PREPARATIONS.

ADEPS PRÆPARATUS.

The fat of the hog (*sus scrofa*), purified by removing the membranes, washing thoroughly in a stream of water and straining, then liquifying at a heat not exceeding 212° F., and again straining.

It is soft and melts at about 100° . It should not have a rancid odour, and should dissolve entirely in ether. It consists of about 60 per cent. of olein, with some palmitine and stearine. Distilled water in which it has been boiled should not give a precipitate with nitrate of silver (absence of chloride of sodium), and should not give a blue colour with solution of iodine (absence of starch).

It enters into the composition of *Adeps Benzoatus*, and forms the basis of many ointments.

ADEPS BENZOATUS.

Made by heating in a water bath for two hours, 1 lb. of prepared lard, and 160 grs. of coarsely powdered benzoin, and finally straining.

Benzoin, as we have elsewhere stated, has the property of preventing lard from becoming rancid.

Adeps benzoatus enters into the composition of all the suppositories, and forms the basis of the following ointments :—

Unguentum Gallæ, *Unguentum Plumbi Acetatis*, *Unguentum Sulphuris*, and *Unguentum Zinci*.

SEVUM PRÆPARATUM.

The internal fat of the abdomen of the sheep (*ovis aries*), purified by melting and straining. It is smooth, nearly scentless, and fusible at 103° . It consists chiefly of oleine and stearine. It enters into the preparation of *Emplastrum Cantharides* and *Unguentum Hydrargyri*.

SAPO DURUS.

Hard soap formed by combination of olive oil and *soda*. It is composed of oleate and palmitate of soda. It is greyish white, horny, easily powdered when kept in dry air, and easily moulded when heated. The presence of a little oxide of iron gives it a red or blue marbled appearance. It is soluble in water, and the solution is precipitated by lime, lead, &c. The ash left after incineration does not deliquesce ; it should be entirely soluble in rectified spirit, and should not give an oily stain to paper. It enters into the composition of *Emplastrum Resinæ*, and *Emplastrum Saponis*, *Extractum Colocynthis Compositum*, *Linimentum*

Potassii Iodidi cum Sapone, and the following pill-masses :—
Aloes Barbadosensis, *Aloes et Assafœtida*, *Aloes Socotrine*,
Cambogia Composita, *Rhei Composita*, *Saponis Composita*,
 and *Scillæ Composita*.

SAPO MOLLIS.

“Soft soap,” formed by combination of olive oil and *potash*. It is composed of oleate and palmitate of potash. It is yellowish-green, transparent, and gelatinous.

The ash left after incineration is very deliquescent; like hard soap, it should be entirely soluble in rectified spirit, and should not impart an oily stain to paper. It enters into the composition of *Linimentum Terebinthine*.

PYROXYLIN.

“Gun cotton,” prepared by immersing 1 oz. of cotton in a mixture of 5 ozs. each of sulphuric and nitric acids, for three minutes, then washing out the acids well with water, until the washings cease to give a precipitate with chloride of barium, and finally draining on filtering paper, and drying in a water bath.

It is readily soluble in a mixture of ether and rectified spirit. When exploded by heat it leaves no residue. It is introduced into the Pharmacopœia for the preparation of collodion.

COLLODIUM.

Collodion is a mixture of 1 oz. of pyroxylin in a mixture of 36 ozs. of ether and 12 ozs. of rectified spirit.

This is a colourless liquid with an ethereal odour; it is highly inflammable, dries rapidly on exposure to the air, forming a transparent film which is insoluble in water or rectified spirit.

COLLODIUM FLEXILE.

Is a mixture of 6 ozs. of collodion; 120 grains of Canada balsam; and 1 drm. of castor oil.

ÆTHER.

“Sulphuric ether of Edin. and Dub.” Contains not less than 92 per cent. by volume of pure ether ($C_4H_{10}O$).

It is unnecessary to give in detail the complicated process for preparing ether, as given in the Pharmacopœia. Suffice it to say, in general terms, that it is prepared by the

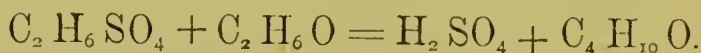
action of 10 ozs. of sulphuric acid on 50 ozs. of rectified spirit, added in successive portions. It is purified by allowing it to stand on chloride of calcium and slaked lime, and re-distilling to the sp. gr. of 0·735.

The following is a brief explanation of the process :—

By the reaction of sulphuric acid on rectified spirit, *sulphovinic acid* ($C_2H_6SO_4$) is first formed, thus :—



By the reaction now of alcohol on the sulphovinic acid, the latter is decomposed, forming sulphuric acid and ether, thus :—



By the addition of more alcohol sulphovinic acid is again formed, and thus by the continuous supply of alcohol, the production of ether becomes continuous, sulphovinic acid being an intermediate product.

It is a colourless, volatile, inflammable liquid, with a characteristic odour; boils below 105°. Fifty measures agitated with an equal volume of water are reduced to 45 by an absorption of 10 per cent. It leaves no residue on evaporation.

It enters into the preparation of *Æther Purus*, *Collodium*, *Collodium Flexile*, *Liquor Epispasticus*, and *Spiritus Ætheris*.

ÆTHER PURUS.

Ether free from either alcohol or water. The process of purification is effected by washing the ether well with water (by which the spirit is removed), and when the liquids have separated after a couple of minutes, decant the supernatant ether; digest the latter then for 24 hours with recently burned lime and chloride of calcium (to remove the water), and finally distil with the aid of a gentle heat. Its sp. gr. should not exceed 0·720, and it should not coagulate the albumen of the blood; if alcohol be present, the sp. gr. will be exceeded, and it *will* coagulate the albumen of the blood.

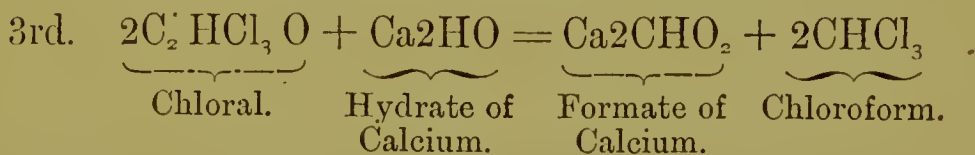
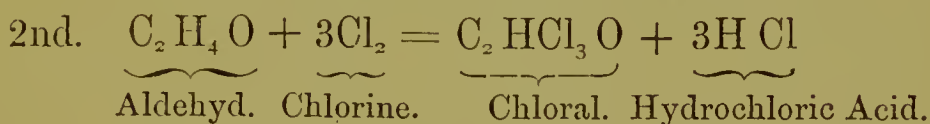
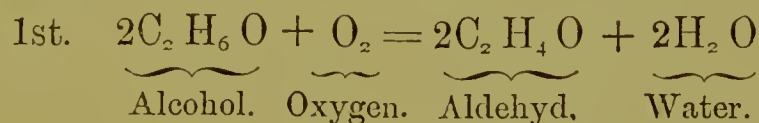
Water and sulphurous acids are occasional impurities, the former increasing its specific gravity, the latter imparting to it an acid reaction.

CHLOROFORMUM.

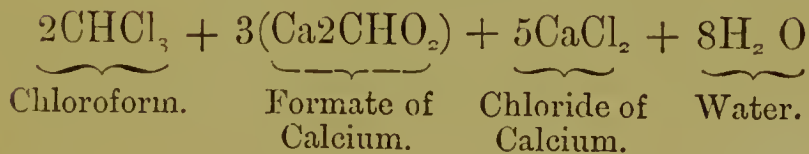
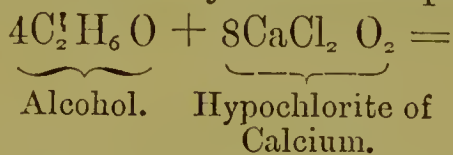
Terchloride of Formyl (CHCl_3).

The following is an abstract of the Pharmacopœial method of preparing chloroform:—3 galls. of water and 30 ozs. of rectified spirit are distilled with a mixture of 10 lbs. of chlorinated lime and 5 lbs. of slaked lime; 50 ozs. of the distillate is well washed with water, and after the mixture separates into two strata, the lower one, which is crude chloroform, is removed, washed repeatedly with successive portions of distilled water, and then shaken with its own volume of sulphuric acid. When the mixture settles, the chloroform is again separated, mixed with 2 ozs. of chloride of calcium and $\frac{1}{2}$ oz. of slaked lime, and again distilled.

The following reactions indicate the probable steps in the process:—



The process as a whole may be thus expressed:—



Chloroform is a colourless liquid with a peculiar ethereal odour and sweet taste. Its sp. gr. is 1.49. It is slightly soluble in water, but soluble in all proportions of alcohol and ether. It is neutral in reaction, should not be coloured by sulphuric acid, and should leave no residue or unpleasant

odour after evaporation. It is decomposed by fixed alkalies, and, on exposure to air and light, is apt to be decomposed into hydrochloric acid and chlorine. It is a powerful solvent of caoutchouc, gutta-percha, resins, many fats and vegetable alkaloids.

The following are its Pharmacopœial preparations:—*Linimentum Chloroformi*, *Spiritus Chloroformi*, and *Tinctura Chloroformi Composita*.

CHARTA EPIPASTICA.

“Blistering Paper.” Prepared by digesting 4 ozs. of white wax, $1\frac{1}{2}$ oz. of spermaceti, 2 ozs. of olive oil, $\frac{3}{4}$ oz. of resin, 1 oz. of cantharides, and 6 ozs. of distilled water, in a water bath for two hours, stirring them constantly and then straining. Mix $\frac{1}{4}$ oz. of Canada balsam with the melted plaster, and pass strips of paper over the surface of the hot liquid.

ABSTRACT

OF THE

PROCESSES DIRECTED FOR THE PREPARATION OF THE ALKALOIDS, ETC.

ACONITIA.

1. Digest the root with rectified spirit to exhaust it of the aconitate of aconitia ~~and resinous matter~~, and then recover the spirit by distillation and evaporation.

2. Dissolve the alkaloidal salt in water, by which means it is separated from the resinous matter.

3. Add ammonia to the aqueous solution of the aconitate of aconitia; aconitia and some colouring matter are thus precipitated, while aconitate of ammonia is formed and remains in solution.

THE ALKALOIDS, ETC.

4. Dissolve the precipitated aconitia by ether, which is afterwards recovered by distillation. *25 To separate from coloring matter*

5. Add sulphuric acid to form sulphate of aconitia, and decompose this subsequently by solution of ammonia; aconitia is thus precipitated, while sulphate of ammonia remains in solution.

6. Wash the aconitia so obtained with cold water, and, finally, dry between the folds of blotting-paper.

ATROPIA.

1. Digest the root with rectified spirit to exhaust it of the malate of atropia. *Exhaust with rectified spirit*

2. By the addition of lime malate of lime is formed, and atropia set free. *Filter &*

3. Add sulphuric acid to form sulphate of atropia.

4. Separate any resinous matter which may be present by the addition of carbonate of potash in quantity sufficient to produce neutralisation; remove the resinous matter so precipitated by filtration.

5. Again add carbonate of potash, but in sufficient quantity to produce alkalinity; sulphate of potash is thus formed, and atropia is set free and removed by chloroform.

6. Distil off the chloroform, and purify the atropia by solution in spirit, digestion with animal charcoal, filtration, and evaporation. *25 g. of 100 (solid) ...*

ATROPIÆ SULPHAS.

Prepared by the action of sulphuric acid on atropia.

BEBERIÆ SULPHAS.

NI 1. Exhaust the bark by sulphuric acid.

2. Concentrate the liquor, and add sufficient lime to precipitate the colouring and vegetable matter, which remove by filtration.

3. Add solution of ammonia to the filtrate, by which means sulphate of ammonia is formed and the beberia is precipitated.

1. Saponify with H_2O give colour - precipitate with ...

4. Dissolve out the beberia by spirit, which is to be recovered by distillation.

5. Again add sulphuric acid to form sulphate of beberia.

6. The sulphate of beberia so obtained is evaporated to dryness, powdered, dissolved in water, and the aqueous solution is reduced to a syrupy consistence by evaporation, and finally dried in thin layers on glass plates.

DIGITALINUM.

Solution in HCl forms a yellow changing to Green
1. Exhaust the leaves of the digitalinum with rectified spirit, which also takes up colouring matter and extractive.

2. Recover the spirit by distillation, and treat the extract with water, charcoal, and acetic acid; the charcoal being used to decolourize the digitalinum which is dissolved by the acetic acid.

3. Add ammonia to set free the digitalinum from the acetic acid, and then precipitate it by tannic acid.

4. Add oxide of lead, ^{refiner} by which means tannate of lead is formed and digitalinum again set free, and dissolved in spirit.

5. Again decolourize with animal charcoal, filter to remove the tannate of lead and charcoal, and again recover the spirit by distillation.

6. Finally wash with ether to remove impurities.

MORPHIÆ HYDROCHLORAS.

1. Digest opium in water, which dissolves out the meconate and sulphate of morphia and some codeia.

2. Add chloride of calcium, to form meconate and sulphate of lime, which are precipitated, and hydrochlorate of morphia, which is held in solution.

3. Evaporate to form a solid mass, and then dissolve out the hydrochlorate of morphia with water. Repeat this process several times, using powerful pressure each time to get rid of the colouring matter, and decolourizing also with animal charcoal.

4. Add ammonia, by which means morphia is preci-

pitated and separated from any codeia which may be present.

5. ~~Treat~~ the morphia with hydrochloric acid to form hydrochlorate of morphia which is allowed to crystallise out.

MORPHIÆ ACETAS.

1. Decompose hydrochlorate of morphia by ammonia.
2. ~~Treat~~ the morphia so precipitated with acetic acid to form acetate of morphia, which is obtained as a dry powder by evaporation and drying with a gentle heat.

QUINIÆ SULPHAS.

1. Exhaust the bark of its alkaloids by hydrochloric acid.
2. Precipitate the alkaloids by adding soda, chloride of sodium being formed and remaining in solution.
3. Add sulphuric acid to the precipitate to form sulphate of quinia and of cinchona.
4. Set aside to crystallise. The sulphate of quinia separates first.

SANTONINUM.

1. Boil bruised santonica with lime and water to form santonate of lime.
2. Precipitate the santoninum by the action of hydrochloric acid; chloride of lime is thus formed, and is held in solution.
3. Skim off the oily matter and decant the fluid from the precipitate.
4. Wash the precipitate with water and with ammonia to free it from acid.
5. Decolourize by animal charcoal, and then dissolve out the santonin by boiling spirit.
6. Set aside to crystallise in the dark and preserve in bottles protected from the light, lest the crystals should become yellow-coloured.

STRYCHNIA.

1. Exhaust the seeds, by digestion in alcohol and water, of the igasurates of strychnia and brucia.
2. Add acetate of lead to form acetates of strychnia and brucia, igasurate of lead being precipitated. *Filter and*
3. Add ammonia to precipitate the alkaloids, acetate of ammonia being formed and held in solution.
4. Dissolve the precipitated alkaloids in spirit, and evaporate the spirituous solution to deposit the strychnia, which separates first, brucia remaining in solution.
5. Wash the strychnia thus obtained until the washings no longer become red with nitric acid, showing the absence of brucia.
6. Dissolve finally in boiling water, and crystallise.

VERATRIA.

1. Exhaust the ground seeds (separated from the capsules by a preliminary process) with rectified spirit to dissolve out the veratria together with gallic acid and resinous matter.
2. Concentrate the solution and pour it into water to precipitate the resin, which is removed by filtration.
3. Add ammonia, by which means the impure veratria is precipitated, while the gallic acid unites with the ammonia.
4. Wash the precipitated veratria with water on a filter, add hydrochloric acid to it to form hydrochlorate of veratria, and decolourize this with animal charcoal.
5. Add ammonia again, by which means the hydrochlorate of veratria is decomposed, the veratria is precipitated, and hydrochlorate of ammonia formed and held in solution.
6. The precipitated veratria is washed until the washings cease to give a white precipitate on adding nitrate of silver acidulated with nitric acid, showing perfect freedom from hydrochlorate of ammonia (a).

(a) The consideration of the characters, tests, &c., of the alkaloids is reserved for a companion work—"Tablets of Materia Medica," which the author has in preparation.

APPENDIX.

VOLUMETRIC ANALYSIS.

We purpose here to give a brief abstract of the method of preparing the "Test Solutions for Volumetric Estimations," and to give in outline an explanation of their use.

The Pharmacopœia gives the mode of procedure in Volumetric estimations according both to the British and Metric systems. We will confine ourselves to the consideration of the former, referring the student to the Pharmacopœia for information with regard to the Metric system.

APPARATUS REQUIRED IN THE PREPARATION OF THE VOLUMETRIC SOLUTIONS.

1. *A Flask*, which when filled to the mark on the neck, contains exactly 10,000 grains of distilled water at 60° F.

2. *A Graduated Cylindrical Jar*, which when filled to 0 holds 10,000 grains of distilled water, and is divided into 100 equal parts.

3. *A Burette*, or graduated glass tube, which when filled to 0 holds 1,000 grains of distilled water, and is divided into 100 equal parts, each part corresponding to 10 grain-measures.

Volumetric solutions before being used should be shaken so as to ensure uniformity of strength ; they should also be preserved in stoppered bottles.

All measurements are to be made at 60° F.

The quantities of substances to be tested are expressed by grains in weight, while the quantities of the test solution employed are expressed in grain-measures. (A "grain-measure" is the volume of a grain of distilled water.)

I.—VOLUMETRIC SOLUTION OF BICHROMATE OF POTASH.



Preparation.—Dissolve 147·5 ($\frac{1}{2}$ equiv.) in a sufficiency of water to fill the 10,000 grain flask.

1,000 grain measures of this solution will thus contain 14·75 grains of bichromate ($\frac{1}{20}$ of an equiv. in grains), and when added to a solution of a *Proto* salt of Iron acidulated with hydrochloric acid, can convert 16·8 grains of iron ($\frac{1}{20}$ th of 6Fe in grains) from a state of *Proto* salt to that of *Per* salt.

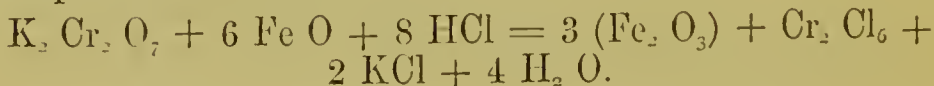
Use.—To determine the amount of Protosalt of iron present in a liquid. The conversion of all the Protosalt into a state of Persalt is known when a little drop of the liquid placed in contact with a drop of solution of Ferrid cyanide of Potassium on a white plate ceases to strike a blue colour.

The following Ferrous preparations are estimated by this solution :—

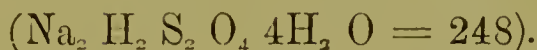
Grains weight.		Grain measures of Vol. Sol.	
20	of	Ferri Oxid. Mag.	will require 83
20	„	Ferri Arsenias	„ 170
20	„	Ferri Phosphas	„ 250
20	„	Ferri Carb. Sacch.	„ 330

Example.—20 grains of Magnetic Oxide of Iron dissolved in Hydrochloric acid continue to give a blue precipitate with Ferrid cyanide of Potassium until 83 grain-measures of the Volumetric Solution have been added.

The following formula illustrates the nature of the decompositions which occur :—



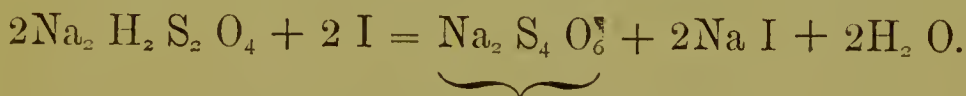
II.—VOLUMETRIC SOLUTION OF HYPOSULPHITE OF SODA.



Preparation.—Dissolve 280 grains of Hyposulphite of Soda in 10,000 grain-measures of water. Fill a burette with this solution, and drop it cautiously into 1,000 grain-measures of the Volumetric Solution of Iodine until the brown colour is discharged. Note the number of grain measures (N) required to produce this effect; then put 8,000 grain-measures of the same solution into a graduated jar, and augment this quantity by the addition of distilled water until it amounts to $\frac{8,000 \times 1,000}{N}$ grain-measures. If, for example, (N) = 950, the 8,000 grain-measures of solution should be diluted to the bulk of $\frac{8,000 \times 1,000}{950} = 8,421$ grain-measures.

1,000 grain-measures of this solution contain 24·8 grains of Hyposulphite of soda, and therefore correspond to 12·7 grains of Iodine.

Use.—To estimate free Iodine, which it does by forming with the Iodine, Iodide of Sodium, and Tetrathionate of Soda, solutions of which are colourless, thus :—



Tetrathionate of Soda.

The following substances are directed to be tested with this solution :—

Grs. weight.				Gr. Measure of Vol. Sol.
60·0	of	Liq. Calc. Chloratæ	<i>will require</i>	500
70·0	„	Liq. Soda Chloratæ	„	500
439·0	„	Liq. Chlorig	„	750
10·0	„	Calx. Chloratæ	„	850
12·7	„	Iodum	„	1,000

As no iodine is present in the first four of these preparations, the Pharmacopœia directs that solution of Iodide of Potassium and Hydrochloric Acid shall be added to them.

III.—VOLUMETRIC SOLUTION OF IODINE.

(I = 127).

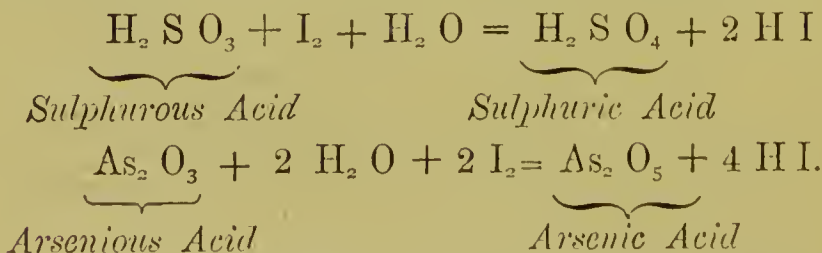
Preparation.—Dissolve 127 grains of Iodine and 180 grains of Iodide of Potassium in exactly 10,000 grain-measures of distilled water. One thousand grain-measures contain 12·7 grains (1-10th of an equiv.) of Iodine, and therefore correspond to 1·7 grains of Sulphuretted Hydrogen, 3·2 grains of Sulphurous acid, and 4·95 grains of Arsenious Acid.

Use.—Quantitative estimation of Arsenious Acid, Sulphurous Acid, Liquor Arsenicalis, Liquor Arsenici Hydrochloricus, and Sulphuretted Hydrogen. The solution is dropped from the burette into the liquid to be tested, until free Iodine begins to appear in the solution.

The following substances are directed to be thus tested :—

Grs. weight.			Gr. Measure of Vol. Sol.
4·0	of	Acid Arsenios	will require 808
441·5	„	Liq. Arsenicalis	808
441·6	„	Liq. Arsen. Hydroch.	810
34·7	„	Acid. Sulphurosum	1,000

We cannot explain this test better than in the words of Dr. Attfield. (a) “Any substance which quickly absorbs a definite amount of oxygen may be quantitatively tested by ascertaining how much of an oxidizing agent of known power must be added to a given quantity before complete oxidation is effected. The oxidizing agents employed for this purpose in the British Pharmacopœia are iodine and the red chromate of potassium ; permanganate of potassium is often used for the same purpose. Iodine acts indirectly, by taking hydrogen from water, and liberating oxygen ; the red chromate of potassium directly by the facility with which it yields 3-7ths of its oxygen.” The following reactions will serve to illustrate the nature of the decomposition.



(a) “Pharmaceutical Chemistry,” 1867. P. 337.

IV.—VOLUMETRIC SOLUTION OF NITRATE OF SILVER.

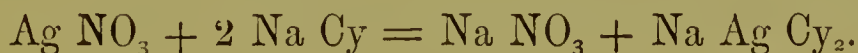


Preparation.—Dissolve 170 grains of Nitrate of Silver in exactly 10,000 grain measures of distilled water. One thousand grain-measures will contain 17·0 grains of Nitrate of Silver (1/10th of an equiv. in grains).

Use.—Quantitative estimation of Hydrocyanic Acid, Bromide of Potassium, and Arseniate of Soda.

Grs. weight.		Gr.-measures of		
			<i>will require</i>	Vol. Sol.
270	<i>of</i>	Acid. Hydrocyan		1,000
10	„	Potass. Bromid.	„	840
10	„	Sodæ Arsenias (dry)	„	1,613

Explanation. — The addition of Nitrate of Silver to Hydrocyanic Acid with excess of Soda causes the formation of a *soluble* double Cyanide of Silver and Sodium (Ag Na Cy_2) until all the Hydrocyanic Acid is exhausted, thus :—



When all the Hydrocyanic Acid is thus expended in the formation of this double cyanide, the further addition of Nitrate of Silver will cause the precipitation of insoluble Oxide of Silver. Hence, if we know the amount of Nitrate of Silver required to produce a permanent precipitate, we can calculate the amount of Hydrocyanic Acid present.

V.—VOLUMETRIC SOLUTION OF OXALIC ACID.



Preparation.—Dissolve 630 grains of Oxalic Acid in exactly 10,000 grain-measures of water.

1,000 grain-measures contain 63 grains ($\frac{1}{2}$ of an equiv.) of Oxalic Acid, and will therefore neutralise *one* equivalent in grains of an alkali or alkaline carbonate, the oxalic radicle being bivalent.

Use in estimating the following substances :—

Grs. weight.			Gr.-measures of Vol. Sol.
59·0	of	Ammon. Carb.	<i>will require</i> 1,000
191·0	„	Borax	1,000
85·0	„	Liq. Ammon	500
52·3	„	„ „ Fort.	1,000
4,380·0	„	„ Calcis	200
460·2	„	„ „ Sacch.	254
413·3	„	„ Plumbi Subacet.	810
462·9	„	„ Potassæ	482
4,380·0	„	„ „ Effer es.	150
458·0	„	„ Sodæ	470
4,380·0	„	„ „ Efferves.	178
38·0	„	Plumbi Acetas	200
56·0	„	Potassa Caustica... ..	900
50·0	„	„ Bicarb.	500
83·0	„	„ Carb.	980
102·0	„	„ Citras.	1,000
113·0	„	„ Tartras.	1,000
188·0	„	„ „ Acida... ..	1,000
40·0	„	Soda Caustica	900
141·0	„	„ Tartarata	1,000
84·0	„	„ Bicarb.	1,000
143·0	„	„ Carb.	960

Exact neutralization is ascertained by litmus paper.

VI.—VOLUMETRIC SOLUTION OF SODA.

(Na HO = 40.)

Preparation.—“ Fill a burette with the solution of soda, and cautiously drop this into 63 grains of purified Oxalic Acid dissolved in about 2 ounces of water, until the acid is exactly neutralised. Note the number of grain-measures (N) of the solution used, and having then introduced 9,000 grain-measures of the solution of soda into a graduated jar, augment this quantity by the addition of water until it becomes $\frac{9,000 \times 1,000}{N}$ grain-measures. If, for example, $N = 930$, the 9,000 grain-measures should be augmented to $\frac{9,000 \times 1,000}{930} = 9.677$ grain-measures.

1,000 grain-measures of this solution contain one equivalent in grains (40) of hydrate of soda, and will therefore neutralise one equivalent in grains of any monobasic acid.”

Use in testing the following substances :—

Gr. weight.					Gr.-measures of Vol. Sol.
445.4	of	Acetum ...	...	will require	402
182.0	„	Acid. Aet.	...	„	1,000
440.0	„	„ „ Dil.	...	„	313
60.0	„	„ „ Glac.	...	„	990
70.0	„	Citric	...	„	1,000
114.8	„	Hydrochlor.	...	„	1,000
345.0	„	„ „ Dil.	...	„	1,000
90.0	„	Nitric	...	„	1,000
361.3	„	„ „ Dil.	...	„	1,000
352.4	„	Nitro-Hydroch. Dil.	...	„	920
50.6	„	Sulph.	...	„	1,000
304.2	„	„ „ Arom.	...	„	830
359.0	„	„ „ Dil.	...	„	1,000
75.0	„	Tart. Dil.	...	„	1,000

THE TEST SOLUTIONS AND THEIR CHIEF USES.

The following seven are made by half ounce of the salt in five ounces of water.

SOLUTION OF	USES.
<i>Acetate of Potash</i> ...	To distinguish between Tartaric and Citric Acids. It gives a precipitate of Bitartrate of Potash with the former.
<i>Acetate of Soda</i> ...	To indicate the constituents of Phosphate of Lime.
<i>Chloride of Ammonium</i> ...	Test for Magnesia. The solution with some free ammonia is added to the substance to be tested; phosphate of soda is then added, and the magnesia is precipitated as Ammonia-Magnesian Phosphate.
<i>Chloride of Barium</i> ...	Test for Sulphuric Acid and Sulphates.
<i>Chloride of Calcium</i> ...	Test for Citric Acid in Citrate of Potash. Citrate of lime, which is formed, is insoluble in hot water, but soluble in cold, there will be therefore no precipitate until the solution is boiled.

<i>Iodide of Potassium</i> ...	Test for Lead. Yellow iodide of lead is formed.
<i>Phosphate of Soda</i> ...	In testing for Magnesia (<i>See</i> Chloride of Ammonium).

The following three solutions are made by dissolving half an ounce of the salt in ten ounces of water :—

SOLUTION OF	USES.
<i>Carbonate of Ammonia</i> ...	To distinguish zinc from alumina and the alkaline earths. It gives a white precipitate of carbonate of zinc soluble in excess.
<i>Ferridcyanide of Potassium</i>	To distinguish proto- from per-salts of iron ; it gives a blue precipitate with a protoxide of iron, no precipitate with a peroxide.
<i>Ferrocyanide of Potassium</i> ...	Test for many metals ; it gives a <i>blue</i> precipitate with per-salts of iron, <i>reddish brown</i> with copper, and <i>white</i> with proto-salts of iron, and salts of manganese, zinc, tin, cadmium, lead, bismuth, antimony, mercury, and silver.
<i>Oxalate of Ammonia</i> ...	Test for lime.
Dissolve $\frac{1}{2}$ oz. of oxalate of ammonia in 20 ozs. of water.	

No general rule can be given for the preparation of the remaining test solutions.

SOLUTION OF	USES.
<i>Chloride of Calcium (Saturated)</i> ...	Test for the purity of Spiritus Ætheris Nitrosi.
Dissolve 336 grs. in 1 oz. of water.	
<i>Sulphate of Iron</i> ...	Test for nitric acid, which changes it to a deep olive green colour.
Dissolve 10 grs. of the granulated sulphate in 1 oz. of boiling water.	
<i>Acetate of Copper</i> ...	To detect presence of butyric acid in valerianate of zinc.
Digest $\frac{1}{2}$ oz. of subacetate of copper in a mixture of 1 oz. of acetic acid and $\frac{1}{2}$ oz. of water at a temperature not above 212° , stirring until a dry residue is obtained. Dissolve this in sufficient water to measure 5 oz.	
The salt is distilled with sulphuric acid, and the solution added to the distillate ; if butyric acid is present a bluish-white precipitate will result.	

- Albumen*
 Rub up the white of one egg with 4 ozs. of water, and filter through clean moistened tow.
- Ammonio-Nitrate of Silver* ...
 Dissolve $\frac{1}{4}$ oz. of nitrate of silver in 8 ozs. of water, and add as much solution of ammonia as will nearly re-dissolve the precipitate at first formed; filter, and add as much water as will make the solution measure 10 ozs.
- Ammonio-Sulphate of Copper* ...
 Dissolve $\frac{1}{2}$ ounce of sulphate of copper in 8 ozs. of water, and add as much solution of ammonia as will nearly re-dissolve the precipitate at first formed; filter, and add so much water as will make the solution measure 10 ozs.
- Ammonia-Sulphate of Magnesia* ...
 Dissolve 1 oz. of sulphate of magnesia and $\frac{1}{2}$ oz. of chloride of ammonium in 8 ozs. of water, add $\frac{1}{2}$ oz. of solution of ammonia, and add as much water as will make the solution measure 10 ozs.
- Boracic Acid*... ..
 Dissolve 50 grs. of boracic acid in 1 oz. of rectified spirit.
- Bromine*
 Dissolve 10 mins. of bromine in 5 ozs. of water.
- Chloride of Gold*
 Dissolve 60 grs. of fine gold leaf in a mixture of 1 oz. of nitric acid, 6 ozs. of hydrochloric acid, and 4 ozs. of water. Add then another oz. of hydrochloric acid, and evaporate at not above 212° until acid vapours are no longer given off. Dissolve the residue in 5 ozs. of water.
- To distinguish monobasic phosphoric acid (with which it gives a precipitate) from the di- and tribasic varieties (with which it does not afford a precipitate.)
- Test for arsenious acid and phosphoric acid, with both of which it gives a yellow precipitate soluble in excess both of ammonia and nitric acid.
- Test for arsenious acid, with which it gives a green precipitate, "Scheele's green," soluble in excess of ammonia.
- Test for phosphoric acid and phosphates.
- To detect presence of turmeric (which it turns red) as an adulteration of rhubarb.
- To test for presence of iodine in bromide of potassium; the addition of a few drops sets free the iodine, which may be detected with mucilage of starch.
- Test for atropine.

Chloride of Tin

Dissolve 1 oz. of granulated tin in a mixture of 3 ozs. of hydrochloric acid and 1 oz. of water by the aid of a gentle heat until gas is no longer given off; add as much water as will make the solution measure 5 ozs.

Test for mercury in ammoniated mercury, and for red oxide of mercury in grey powder.

Gelatine

Digest 50 grs. of isinglass and 1 oz. of water for half an hour in a water bath, with frequent shaking; filter through clean moistened tow.

To distinguish between gallic and tannic acids, with the latter of which it gives a yellowish white precipitate.

Iodate of Potash

Rub 50 grs. of iodine and 50 grs. of chlorate of potash together; place in a Florence flask, and pour upon it $\frac{1}{2}$ oz. of water acidulated with 8 mins. of nitric acid; digest at a gentle heat until the iodine disappears. Boil for one minute. Evaporate to perfect dryness at 212° . Dissolve residue in 10 ozs. of water.

Test for the presence of sulphurous acid in acetic acid and glacial acetic acid. When added to acetic acid mixed with mucilage of starch, if sulphurous acid be present the iodate is decomposed, iodine set free, and the starch coloured, thus :

$$\text{KIO}_3 + 3\text{H}_2\text{SO}_3 = \text{KI} + 3\text{H}_2\text{SO}_4$$

Perchloride of Platinum

Pour a mixture of 1 oz. of nitric acid, 4 ozs. of hydrochloric acid, and 2 ozs. of water on $\frac{1}{4}$ oz. of platinum foil, and digest at a gentle heat, adding, if necessary, more of the acids in the same proportion until the metal is dissolved. Transfer the solution to a porcelain dish, add 1 drm. of hydrochloric acid, and evaporate on a water bath until acid vapours are no longer evolved. Dissolve the residue in 5 ozs. of water.

Test for potash, with which, in the presence of hydrochloric acid, it forms a sparingly soluble double salt. It is also used as a test for nicotine.

Sulphate of Indigo

Heat 5 grs. of indigo and $\frac{1}{2}$ drm. of sulphuric acid in a small test-tube over a water-bath for an hour. Pour the solution into 10 ozs. of sulphuric acid, and when the undissolved indigo has subsided decant off the clear liquid.

Test for presence of free chlorine, which decolorizes it.

Sulphate of Lime Test for oxalic acid.

Rub $\frac{1}{4}$ oz. of dry sulphate of lime in a mortar with 2 ozs. of water; add this to 18 ozs. of water, and, when the undissolved sulphate of lime has subsided, decant off the clear liquid.

Sulphide of Ammonium Test for various metals, viz :—

Pass sulphuretted hydrogen gas into an ounce of solution of ammonia until the gas is no longer absorbed. zinc, *white* precipitate; mercury, silver, lead, copper, bismuth, tin, gold, and platinum, *brown or black* precipitate. It affords no precipitate in a neutral solution of arsenic, but gives an *orange-red* precipitate in a neutral solution of antimony soluble in excess.

Tartaric Acid Test for potash.

Dissolve 1 oz. of tartaric acid in 8 ozs. of water, and add 2 ozs. of rectified spirit.

We must here allude to two other important tests, viz., Sulphuretted Hydrogen Gas and Volumetric Solution of Nitrate of Silver.

Sulphuretted Hydrogen Gas is a test for the metals: thus, it gives in neutral solutions containing *arsenic* a yellow precipitate soluble in ammonia, and sulphide of ammonium, but insoluble in excess of hydrochloric acid; it gives in solutions of *persalts of tin* a yellow precipitate soluble in hydrochloric acid; it gives in acid solutions of *proto- or per-salts of mercury*, salts of *silver, lead, copper, bismuth, protoxide of tin, gold*, and *platinum*, black or brown precipitates.

Nitrate of Silver is a test for *hydrochloric acid* and *chlorides*, with which it gives a white precipitate soluble in excess of ammonia, but not in nitric acid; for *hydrocyanic acid* and *cyanides*, with which it gives a white precipitate soluble in boiling nitric acid; for *tribasic phosphoric acid*, with which it gives a yellow precipitate soluble in excess of ammonia and nitric acid; and for *arsenic acid*, with which

it gives a brick-red precipitate soluble in excess of ammonia and nitric acid.

For further information with regard to these tests, the student is referred to Garrod's *Materia Medica*, from which excellent little work many of the foregoing observations have been taken. The student may also advantageously consult Bentley and Redwood's edition of "*Pereira*," Royle and Headland's "*Materia - Medica*," Scoresby - Jackson's "*Note - Book*," Attfield's "*Pharmaceutical Chemistry*," Squire's "*Companion to the Pharmacopœia*," and, last, but not least, Macnamara's edition of "*Neligan's Medicines*."

In the compilation of the foregoing pages the author desires to record the assistance which he has often times derived from a perusal of these and many other works too numerous to mention.

THE END.



